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THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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THE HORSELESS AGE

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The Air-Cooled Motor Situation.

At was predicted in these columns at the beginning of the year, not all the air-cooled cars which were then brought forth have proven successful. A number of the air-cooled machines exhibited at the shows last winter were never manufactured in lots, and in some of the cars of this type extensive changes were found necessary at an early period, although the trouble may not always have been with the radiating system. The rush into the manufacture of air-cooled cars last winter was due to two principal causes, both related to each other. The first is the favor with which a large portion of the buying public regards the air-cooling feature, and the other the relatively high prices commanded by one or two popular air-cooled cars of comparatively simple construction. These machines had been on the market for a considerable period, and of their permanent success there seemed to be little doubt. But the difficulties of the problem of successful air-cooling were generally underestimated. There are certain limitations to the air-cooling principle which will probably never be overcome. To ensure success, special precautions are necessary both on the part of the manufacturer and on that of the operator. The older manufacturers of air-cooled cars have learned by experience what these precautions are, and are careful to observe those relating to the manufacture of the cars and take pains to ensure the observance of those relating to their operation. For instance, a New York agency handling a well-known air-cooled car will only sell it to experienced operators. It is held that a driver who may be expert in the operation of a water-cooled car is still unfit to drive an air-cooled machine, as certain methods of control which would be harmless with a water-cooled motor would result in endless trouble with an air-cooled one; but an experienced driver, who already understands the general principles of automobiles, finds it much easier to learn the special precautious necessary with air-cooled vehicles.

One of the special precautions in the manufacture of air-cooled cars is to gear them as low as possible, and still meet the requirements of purchasers, so that the use of the hill climbing gear is very rarely required, and the car can generally be operated on "small throttle." The conditions for efficient air-cooling are, of course, least favorable in very hilly country, and one of the successful manufacturers of this type of car makes it a rule not to encourage the sale of cars in hilly districts.

In the operation of the cars, a practice that must be avoided is the so-called "spark control," that is, regulation of the speed of the motor by retarding the spark beyond the most effective point of ignition. Speed control of the motor should be effected by means of the throttle, in such a manner that whatever the amount of power required by the car, it is obtained with as small a charge per cycle as possible; in other words, that the greatest possible fraction of the energy contained in the charge admitted is converted into mechanical power and the least possible passes into the cylinder wall. The method of attaining this object is not always readily grasped by the novice, and to prevent abuse of the motor owing to carelessness or inexperience, one manufacturer interconnects his spark timer and throttle valve, although admitting that this method of control is not correct theoretically.

In conclusion, the construction of an air-cooled motor is a more delicate problem than the construction of a water-cooled motor, and although perfectly successful air-cooled motors are being built, success in this line is only achieved by great care in construction and intelligent operation.

Annual Changes in Model.

At this season of the year few novelties are brought out in the automobile line, but most of the manufacturers are busily at work on their new models for next year, which will make their appearance about the time of the New York Show in January. The production of a new model is a very important undertaking, and probably few laymen realize how much care and thought is bestowed upon it. The problems involved are not solely of a mechanical character but include some of a commercial nature, as, for instance, an anticipation of market conditions the coming season, so far as that is possible. It is undeniable that at the present time the success or non-success of a car depends to a large extent upon fickle public fancy or fashion, and it is therefore most important for a manufacturer before starting out to design his new model to determine what the demand is likely to be for the coming season.

The trend of fashion usually manifests itself in the popularity of certain makes of cars, hence in most cases the production of a car to meet the popular demand involves a certain amount of copying. On this subject of copying there is a great difference of opinion, and the most extreme policies are pursued by different American manufacturers. While some of the earlier types that achieved more or less instant success were slavishly copied in all details by some concerns, who made exact reproductions, perhaps "one shrinkage smaller," quite a number of others have been extremely conservative in their policy, and have developed their machines along their own lines, apparently with little regard to the work of others.

Neither policy is commendable. Of course, striking originality always excites admiration, but is of little commercial value unless coupled with practicability, and this combination is, unfortunately, rarely met. The progressive manufacturer will keep well informed of what his competitors are doing and try to profit by their experience, as well as by his own. Patent rights must, of course, be respected, but there are numerous problems in automobile design the correct solution of which is not subject to patent protection. No single manufacturer can expect to be the first to solve any great number of these problems, and it would tend to a more rapid advancement of the industry if such solutions were adopted by all as rapidly as possible. No little judgment is required to discern a superior solution of a problem in design, and the slavish copyist is likely to appropriate the bad as well as the good features of a popular car. No car has yet reached perfection, each design embodying some features which are capable of improvement, and a car may be highly successful in spite of certain defects or poor features. For instance, when the Mercedes first began to achieve popularity it had a motor with double valve pockets, one on each side of the cylinder. This feature is now generally recognized as a bad one, and was abandoned by the Mercedes people the following season; but most of those who began to copy the Mercedes adopted the double valve pockets along with its other features, mechanical inlet valves, honeycomb radiator, etc.

The policy here advocated seems to be pursued by French manufacturers. While six years ago a large number of widely different systems of automobile construction were exploited in France, at present practically all the successful makes are so much alike in their general features that at a little distance it is impossible to tell them apart.

Agents' Discount Rates.

In the reports of the last meeting of the A. L. A. M. the "sales and agency question" is mentioned as one of the topics of discussion. It is well-known that the "Licensed Association" is making efforts to prevent cars of licensed and unlicensed manufacture being handled by the same agents, and means of accomplishing this end is evidently one of the most important phases of the agency question; but perhaps an even more important subject at the present time is the general demand of agents for an increase in the discount rate. A practically uniform rate of agents' discount prevails now throughout the industry, except that one or two manufacturers of touring cars are allowing a somewhat smaller rate, and several runabout manufacturers in addition to the usual agents' discount rate pay freight on the machines from factory to destination.

It is claimed that the present rate is entirely too low, and that agents in the smaller cities with only a small contingent of wealthy or well-to-do residents find it impossible to net a reasonable income. Since the Licensed Association has taken upon itself to control the agency business, some of the agents for licensed cars have addressed to it their complaints with respect to the discount rate, but it is understood that the Association has taken a very arbitrary stand in the matter. On the other hand, many of the more prominent unlicensed manufacturers are said to be inclined to consider favorably the demand for an increase in the discount rate. It appears, therefore, that the fight between the Licensed Association and the unlicensed manufacturers will in future be fought chiefly along the line of agency appointments, and it may be predicted that if the leading unlicensed manufacturers agree to an increase in the discount rate next fall when agency deals for the coming season begin to be made, the licensed manufacturers will find it necessary to follow suit.

Grade Crossings.

An alarming number of accidents to automobilists at unprotected railroad crossings have been reported within the last few weeks, bringing the subject of better safeguards at crossings prominently to the fore. At least four serious accidents of this kind, one or two of them fatal, have occurred in the immediate vicinity of New York City within this period, and similar accidents are reported from other parts of the country. Whatever may have been the direct causes that led to these accidents, it is evident that these crossings where they occurred, and others where similar ones might occur, are sources of danger and that public safety requires more effective means of protection.

It is to be doubted that automobiles are more exposed to danger at these crossings than is other road traffic. Horse vehicles and pedestrians are run down at crossings almost every day, but in the case of an automobile more attention is naturally given the occurrence by the public press, partly owing to the comparative novelty of such accidents and partly on account of the present general public interest in automobiles.

The opportunity offered by the recent accidents should not be lost, and all possible pressure should be brought to bear on the proper authorities to insure the provision of more adequate protective measures. Meanwhile we would again warn all automobilists to observe the utmost caution at unprotected crossings.

Solid Rubber Tires.

By Lewis Jones, Jr.

I have used solid rubber tires on one of my cars for about five years. This car is a large one, weighing 3,400 pounds, and has 2½-inch tires. During this time I have used up two sets of 2-inch rear tires and one set of 2½-inch rear tires. The latter, however, were discarded not because they were actually worn out, but on account of creeping on the channels, which I will explain later. This set must have run 1,000 miles, and were very little worn on the outside when discarded, and had they been tightened in time would doubtless have run 1,000 miles more. On this machine each rear wheel carries about 1,000 pounds. On the front wheels I have worn out one set of 2-inch tires, but cannot accurately tell the distance covered. The front tires now on have run about 2,000 miles, so far as I am able to estimate, and are but little worn. Each front tire carries a weight of 700 pounds. The 2-inch tires gave fair service, but are too light for the weight.

On my small car, which weighs about 2,000 pounds, I first had pneumatic tires, but had so much trouble with them that I soon replaced them with 2-inch solid ones on 31-inch wheels. The driving wheels carry 600 pounds each, and these tires will run about 2,500 miles. The front wheels are the same diameter, and the tires carry about 400 pounds each; they have run at least 4,500 miles, and I think they will run 2,000 or 3,000 miles more.

While this is not a racing machine and is not claimed to develop any great speed, it runs about as fast as the average motorist cares or is permitted to travel upon the road, and is seldom passed by others having pneumatic tires. Under favorable road conditions I can reach a speed of about 35 miles per hour. I find that on country roads and on macadam or asphalt streets there is but little difference in riding between pneumatic and solid tires, but on all classes of rough stone pavement, on macadam where the large stones are somewhat exposed, and in crossing car tracks, the whole machine is subjected to a rather unpleasant jar with solid tires, which occasionally causes the small boy to cry "Ice."

When I changed from pneumatic to solid tires, I thought possibly it would be necessary to make the gear slower, but found that the reduction in diameter of the driving wheels, due to the smaller tires, more than compensated for any loss of power that might be caused by the change of tires. In other words, I found I was able to climb hills on the high gear which I could not climb on this gear with the pneumatics. I am informed that accurate tests on electric machines confirm this conclusion, that solid tires require less power.

I feel that I have little, if any, more trouble with bolts and nuts jarring loose than others who use different tires, but more strain comes upon the springs when solid tires are used, and these are more likely to break than any other part, but my past experience in the breakage of springs has taught me to have them made long rather than short and heavy, as the vibration when they are short is apt to snap them off more readily than when the bending is distributed over a longer leaf.

An objection to solid tires is their tendency to creep. To those who are unfamiliar with solid tires I might explain that this means that the rubber turns around over the channel, and the wire which holds the tire to the wheel works around in the rubber, causing the tire to wear out and come off the wheel, which was my experience on one of my long trips.

Any difficulties with solid tires can usually be anticipated a hundred or more miles ahead, but those with pneumatic tires as a rule come unexpectedly. This creeping with the solid tires, however, depends much upon the way in which they are put on. I once found a man employed by a well-known tire maker soaping the rim in order to make the tire slip more easily while he was putting it on the wheel. These tires, of course, gave me very poor service.

To obtain satisfaction with solid tires, they should be examined frequently, and as soon as they appear the least bit loose on the channels, have them tightened, to prevent creeping. Those supplying the tires will usually tighten them free of charge. One can safely run 100 miles after they begin to loosen, and when the tire came off on the long trip to which I previously referred, I ran over 100 miles without the tire and with no injury to the wheel other than slightly cracking the channel.

A pneumatic tire may not sink quite so deep in deep mud, but my experience leads me to believe that I can go anywhere with solid tires that others go with pneumatics, although I have not been able to make a satisfactory test of the matter. As to their operation in snow, there has been no snow for the last three years that prevented the use of the machine in the suburbs of Philadelphia, and the following experience leads me to think they are quite as good for snow as pneumatic tires.

Last winter a friend who has a car of about the same weight and equipped with 4-inch pneumatic tires was afraid to venture on a certain piece of road that was drifted full and had no tracks broken. I drove my machine back and forth over this road several times in order to break the road for him, going both up and down the road, after which he attempted to go down it, and stuck on account of the wheels slipping, and had to be shoveled out several times.

With solid tires I think there is no more difficulty in turning corners at high speed as with the pneumatic.

While I realize the objections I have mentioned in connection with solid tires may discourage some from trying them, I feel that on the whole they are cheaper in the end, because there should be no repair bill until they are worn out, and the freedom from anxiety with regard to punctures, etc., at inopportune times more than compensates for any lack of comfort due to their use.

Progress in Kerosene Burners.

By M. C. Krarup.

On May 28, 1902, The Horseless Age published a "Kerosene Number," recording all the successes and most of the failures in burning kerosene up to that date, in vapor explosion engines as well as under boilers. Of course, all the successes were more or less theoretical or in the nature of laboratory experiments, or else there would be no need of a sequel to the tale. What has been the practical progress since then?

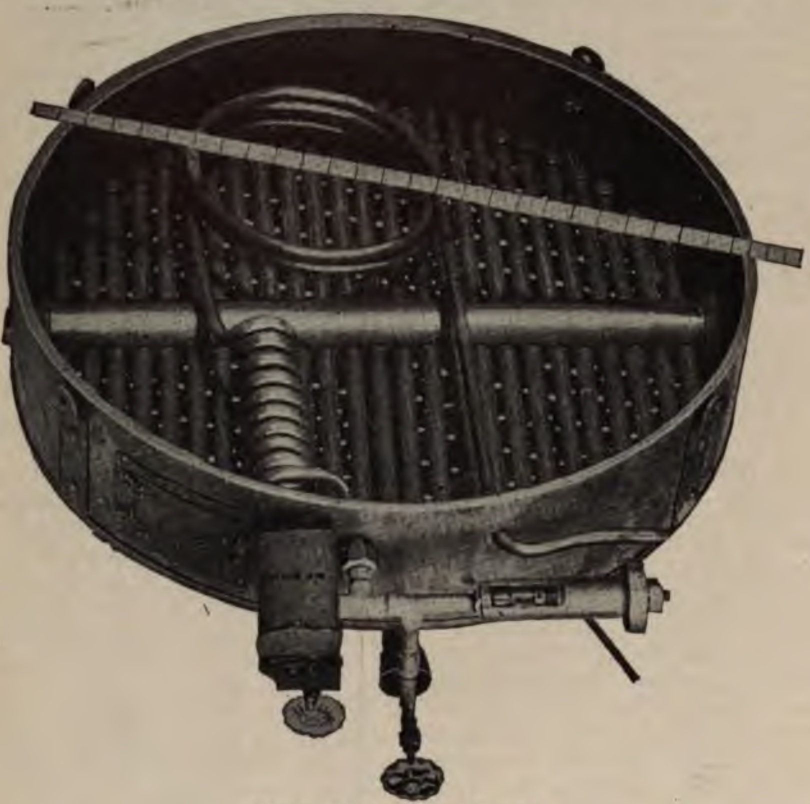
It may be stated at once that, so far as automobiles are concerned, the progress seems to consist mainly in a somewhat general diffusion of the information contained in that "Kerosene Number" of two years ago, resulting, however, more in a keen realization of the difficulties pointed out therein than in the devising of means for overcoming them. And yet that issue really gave the clue to improvements, as one finds by comparing its records with a few highly significant instances of exceptional success.

One complete success, fully authenticated, would of course be decisive. All we would have to do would be to study it and imitate it. But there is a gap in which unfortunately the kerosene-fired automobile steam boiler fits very nicely. The prospects for the internal-combustion engine look much more flattering, but even herein one may find a moral in favor of an inclosed fire chamber and mechanically regulated air supply for steam generators.

Last April there arrived in the port of New York the steamboat "Nebraskan," of the American-Hawaiian Steamboat Company, after a continuous voyage of 12,000 miles, from San Francisco, completed in 52 days, 7 hours and 26 minutes. Oil had been the fuel throughout under one of the 1,400 horse-power boilers, and the boiler shell and tubes were in perfect order, while the economical saving, compared with a previous trip with coal fuel, was very considerable. The oil was not exactly kerosene but a residuum obtained from crude California oil by distilling away the volatile portions. It contained some asphaltum and had a high flash test. Valdemar F. Lassoe, the chief engineer of the line, stated that the furnace doors had not been opened during the entire voyage, and that the steam gauges hardly ever varied more than a fraction from a working pressure of 200 pounds. "In our plant," he explained, "the oil is pumped to a heating tank and brought to a temperature of 175 degrees Fahrenheit. Then it is carried at a pressure of 15

pounds to the atomizers, where it mixes with heated air supplied at a pressure of one and a quarter pounds. The fine spray so formed is almost a gas and in that manner it is burned."

Assuming, as I think we may, that the fuel oil used in this case was no more stable in its composition than kerosene, and would be as liable to crack as the latter (by exposure to excessive heat before the conditions for immediate and complete combustion are present), we may infer that the methods employed in the "Nebraskan" would have brought equally good results with kerosene, apart from economy. Note that in this installation the oil is not heated above 175 degrees until it is atomized and mixed with air. It is not



WALKER'S KEROSENE BURNER.

vaporized before the hot air carries it into the furnace under pressure.

From a report by the Navy Department, whose Liquid Fuel Board consists of Commander John R. Edwards and Lieutenant Commanders W. H. Parks and Frank H. Bailey, we learn that this board made a special inspection of the "Nebraskan," and we find the following passage: "The value and necessity of installing a series of draft gauges between the ash-pan and the base of the stack was conclusively shown." This refers to tubular boilers (though perhaps not to the "Nebraskan"), while with regard to water tube boilers the same report says: "Under forced draft conditions . . . and oil as fuel, the solution of the smoke question is nearly as remote as ever." The Liquid Fuel Board also points out that the steaming capacity of a boiler is higher when highly heated compressed air is used as the atomizing and spraying medium than when steam is used.

The discerning reader will readily see that the installations which secure complete combustion in ships—uniform pressure feed of the oil, heating of compressed air for spraying and provisions to prevent the draft from carrying the oil-and-air mixture beyond the zone of greatest heat before complete combustion has taken place—are not readily duplicated in steam automobiles, and also that the means for reducing steam generation to such a minimum as is regularly required in the operation of an automobile, remain in doubt.

Parenthetically, a certain analogy between draft gauges and the baffle plates and fire-brick arches used in some large automobile truck burners may be noted, all of which serve the purpose of limiting the combustion zone and preventing carbon from escaping and forming smoke, as well as the purpose of storing heat for ignition. When it is remembered that flame propagation is much retarded when the proportion between air and oil departs from a certain ratio and cannot take place when the velocity of the gaseous mass exceeds that of the flame, one may easily imagine that some provision to prevent smoke and odor is necessary with an automobile burner when the oil feed is throttled without an immediate and corresponding checking of the air current. Here, too, then, is an argument for a mechanically regulated and finely divided draft.

The nearest approach to compliance with the conditions here referred to I find in a burner made by the E. C. Walker Company, of New Albany, Ind. The draft, while not under positive control, is regulated by two air-damper plates under the fire-box, both perforated and the upper one shiftable to bring its perforations out of register with those of the lower one. Being slightly separated the plates admit some air for combustion, even if the holes seem entirely closed. The lower plate is flanged upward at its circumference to enclose the upper one and make a tight joint with the fire-box, thus excluding entrance of air except through the perforations.

The air passes up between parallel burner tubes, wiping past minute holes bored obliquely (80°) in the latter, out of which holes streams the mixture of air and kerosene vapor produced in the coil vaporizer heated by a pilot light above the tubes, and in a mixing tube of the Bunsen pattern. The regularity and division of the air supply, the proportioning of its volume to the volume of vapor at each of the thousands of apertures, and direct impingement of air upon each diminutive jet, have been ingeniously provided for in more ways than here indicated, but the makers candidly admit that the vapor contains carbon dust in plenty, produced by the "cracking" or decomposing of the kerosene in the vaporizing coil. Far from discouraging this well-known phenomenon by a low heat in the coil, they take the bull by the horns, making the pilot light heat very intense and obtain thereby, they say, such dry vapor and fine pulverization of the carbon as to make absolutely sure of the latter being carried out through the nozzles and apertures with the vapor and consumed in the flame—leaving no deposit anywhere. The air pressure is 40 pounds. The flame impinges directly upon the crown sheet of the boiler. The system has been applied with equal success to fire-flue, water-tube, and flash boilers, and works without deposits whether the oil feed is full open or way down low.

If all this can be substantiated, there is here a new principle for taking care of the refractory elements of commercial kerosene, at variance with anything mentioned in the "Kerosene Number" of two years ago, and depending apparently partly upon the heat generated by the pilot and partly upon a fine and appropriate division of the air supply to sustain a very rapid flame propagation. Personally I would surmise that an extremely close watching of the air draft regulator would be a necessity with this system.

Be this as it may, every other indication points the road to success in another direction.

As Harrington Emerson records in the "Kerosene Number," referring to a line of experiments undertaken mainly with a perfected kerosene vapor explosion engine in view: "Attempts were made to vaporize the oil without atomizing, but without suc-

cess. When the oil was heated with all air excluded in a closed vaporizer, cracking invariably occurred, and in a short time both the vaporizer and the valves and passages were clogged up with carbon deposit."

This agrees with the opinion of the National Oil Burner and Equipment Company, of St. Louis, who pronounce flatly that: "No burner which vaporizes the oil within the burner will ever give satisfaction." Other passages show that they mean the oil should be vaporized and burned in the fire-box after being atomized by means of compressed air or steam. The spray burner which they furnish for automobiles is designed on this system, but has apparently not been worked out in combination with a solution of the air supply and draft regulation question. Considering that highly heated air and draft gauges have been found necessary in the marine installations referred to above, in which the steam plant is supposed to work at a much more constant pressure than would be practicable in automobile work, it may perhaps be taken for granted that this simple method has some serious drawbacks.

Blue Flame Kerosene Burner.

Another kerosene burner which has been used with success by owners of steam cars is that known as the "Blue Flame" burner, which is handled by John Simmons & Co., of New York. The pilot light or starting device of this burner consists of a plain casting with detachable base located below the burner some distance from its circumference; thus all flame is confined within the diameter of the burner proper, preventing its communication to the woodwork of the carriage and the hands of the operator. In the pilot light is a simple generating coil carrying the tank pressure, the flame from which coil plays upon the main vaporizer. The fire is started with either wood alcohol or kerosene, which is poured into the pilot lamp and lighted with a match.

Some gentlemen connected with the General Electric Company are pursuing a different plan, based, however, on the same general idea that premature decomposition of the fuel, resulting in free carbon, must be avoided. They propose to evaporate the kerosene under atmospheric pressure so that its temperature will take care of itself, but I have not been able to learn of the exact means by which they hope to overcome the obvious difficulties of such a course, which at all events is only in the experimental stage.

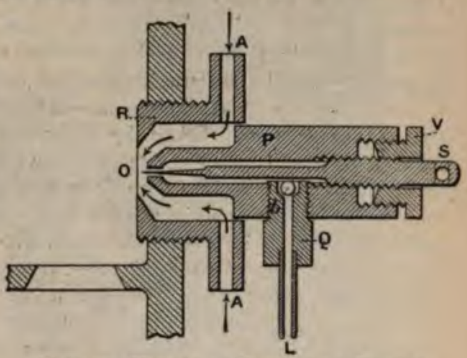
Reports of stationary explosion engines in which kerosene is burned successfully by the spray method, are numerous, but not until lately have claims been advanced involving complete combustion and high piston speed, as well, in automobile motors over their whole range of action—from full power to lowest throttling. Since the spray method as used under boilers leads practically to an explosive fire, only with continual combustion, all that is accomplished with kerosene in explosion engines may serve to illustrate what has been done and what may be done to improve kerosene burners. Perhaps we may find a principle common to both. In fact, if we should find that kerosene burns under one law in an explosion engine and under another under a boiler, we ought to be very much disconcerted.

The essential facts vouchsafed by *La Vie Automobile* in regard to an old Peugeot gasoline motor in an automobile which was made to operate beautifully in a recent public fuel consumption test with either moth balls (naphthaline), or kerosene or gasoline, are about as follows:

The napthaline balls are simply melted, one after another, before they are used, and this is done by means of the exhaust; the melted mass is treated as kerosene. The latter, only, interests us here. It is fed to a constant level float chamber from which rises a pipe to a spray nozzle with an adjustable needle—not unlike such gasoline feed valves as the Lunkenheimer. The nozzle is at a higher level than the float chamber, so that a column of liquid has to be lifted at each discharge; it is screwed into the motor, so that the capillary opening gets very close to the induction valve, discharging, in fact, directly upon the valve stem. Air channels are formed in the screw-threaded plug through which the nozzle enters. In order to start a motor with this arrangement and kerosene as fuel the valve chamber must first be heated, either with a torch or by starting with gasoline.

The two most interesting features in this affair are, first, that a great deal of noise has been made about its successful operation among men thoroughly familiar with everything previously brought out in Europe in the way of kerosene explosion engines, and, secondly, that highly energetic suction through an extraordinarily small opening, coupled with almost direct injection of the mist into the hot motor, is here taking the place of the injections under extraordinary compressions used in Diesel engines. When started cold with gasoline, nothing but the compression stroke can effect the vaporization, and a strong suspicion remains that under those circumstances no true vaporization takes place but only an extreme atomization, and also that a still more extreme atomization might be sufficient to permit starting with kerosene from the cold.

But how about throttling this motor? Well, it is distinctly said that it works only with a very energetic suction. The float chamber is placed lower than the nozzle on purpose, so that weak suction shall not be able to draw a surplus of oil at small velocity, while with high piston speed the high lift serves to draw the oil violently through the needle valve and hurl it against the induction valve stem. The air channels and needle valve are subject to adjustment once for all time for each liquid, but not for throttling purposes. If any throttling is done, it must be effected by the exhaust, and as no mention hereof is made, and such throttling seriously affects the suction, anyway, I am bound to believe that the old Peugeot car to which the arrangement is fitted is really intended to be operated on the road mainly by the change-gear and perhaps a little by the brake, though the latter, of course, would affect the piston speed. Nevertheless, the enthusiasm of *La Vie Automobile* is boundless, and its editor usually knows what he is talking about. So I infer, that automobile



French Kerosene Injecting Device.

kerosene engines that *can* be throttled are not very prominent in Europe, and if we have any in America we ought to hurry up and proclaim it and prove it, so that we shall not lose this glory, as we have lost others.

But for the present—looking for data—I am compelled to dismiss the claims made for some American automobile motors to the effect that they may be operated just as well on kerosene as on gasoline, once started.

The fact remains, however, out of all of this, that kerosene, somewhat heated and highly atomized and intimately mixed with sufficient air, will burn completely, without leaving any deposit (at least less than gasoline, it is stated) on valves, in a motor that acts as a flash vaporizer; in other words, when the atomized oil is given no time to either condense or crack before ignition begins.

The only difference between these conditions and those observed in the successful kerosene furnace for steam generation seems to be connected with the velocity of

flame propagation. In the furnace this must be taken care of by draft gauges and deflection arches or suitably shaped piles of non-fluxable rock [magnesite, says the Kerosene Number] and by the proportions between the quantity of the atomizing medium (steam or hot air) and the quantity of oil. In the internal combustion engine the piston plays the part of the furnace draft. If its speed is higher than the spread of the flame, imperfect combustion will result, and high compression, correct mixture and high temperature will all increase piston speed as well as the rapidity of the combustion. So, there you are, with an apparently unavoidable loss of efficiency staring you in the face (from the fact that kerosene vapor burns so much more slowly than gasoline vapor), unless it is found that high compression will expedite the flame more than it will the piston. Doubtless it will. At any rate a load may be utilized to reduce the piston speed and will not affect the flame spread. But then there is the possibility of premature ignition, and to avoid this bugbear we find ourselves in the arms of Diesel, injecting our fuel, atomized or otheryise, at the height of compression; and in doing this we also get under way to throttling of the motor, something which seems exceedingly hard to compass in any other way, with kerosene. I can see only this hope—but that is a bright ray—that by devising new means for a much more energetic atomization than that which is accomplished by siphoning action, we may be able to get along with much lower compressions than 600 pounds, and yet be able to obtain reliable ignition and combustion with a considerable variation in the composition of mixtures.

When we revert to the Walker burner with its finely commuted draft and painstaking attention to proportions between fuel and air subdivisions, and again to the furnace of the "Nebraskan" with its effective hot-air atomizers whose action is assisted by a furnace interior hot enough to ignite anywhere, we see, seems to me, that highly energetic atomization (in an atmosphere containing sufficient oxygen, of course) is the most reliable agency for creating a kerosene vapor mixture, explosive or non-explosive, which may be ignited and consumed as fast as it is fed, under such variations in the other conditions for combustion as are bound to exist in automobile burners or automobile explosion motors, accordingly as they are operated under full power development, under reduced power development or at their start.

I see no other agency which may be kept constant and by its constancy may overcome the effect of those unavoidable variations.

The new City Hospital at Cincinnati is to be provided with gasoline ambulances, according to Dr. C. R. Holmes, president of the commission in charge of the work.

St. Louis Tour Notes

George S. Waite, Chairman of the Cleveland Division, has sent to the headquarters of the A. A. A. commitee additional road information and new maps of the roads from Cleveland to Toledo and beyond. Mr. Waite believes, however, that the road is so clear that the tourists will have to pay little attention to road directions and can rely on the confetti trail almost entirely. Mr. Waite has lately visited Erie, Pa., and found that the arrangements to care for the tourists were rapidly being completed there.

At Cleveland the headquarters of the local club are at the Hollenden Hotel, and the rooms of the club will be thrown open to the travelers and a local committee will be on hand to direct the drivers to whatever garage is decided upon. The Central Armory has been suggested, but it may be found possible to take care of the tourists in other garages.

Further information with regard to the routes west of St. Louis has been received from the Kansas City committee. Two roads across Oklahoma have been suggested. One route follows the Santa Fe R. R. and embraces the following towns: Ardmore, Norman, Oklahoma City, Guthrie, Perry, Ponca, Newkirk, entering Kansas at Arkansas City. The other route is along the Rock Island R. R. through Terral, Ryan, Marlow, Chickasaw, El Reno, Kingfisher, Enid, Pond Creek, Medford, entering Kansas at Caldwell. Both of these routes should be combined at Wichita, Kansas, the one from Arkansas City going to Wichita via Winfield, and the one from Caldwell via Wellington. From Wichita the route through Kansas to Kansas City is as follows: Wichita, Newton, Peabody, Florence, Elmdale, Cottonwood Falls, Emporia, Osage City, Ottawa, Olathe and Kansas City.

Inquirers from Iowa asking about the route to St. Louis have been advised to connect with the Denver and Kansas City tourists by coming through Kirksville, Macon, Moberly, Centralia, Mexico, and Danville, joining the main body at Warrenton.

Gast & Lang, who maintain a repair shop at Fremont, Ohio, have written to the committee suggesting that a few miles detour at that point for the tourists of the St. Louis pilgrimage will enable them to run through Speigle Grove, the home of the late President, R. B. Hayes. Speigle Grove contains about sixty acres and has beautiful drives extending through it in all directions. A good view of the Hayes house and buildings can be obtained from the cars. The writers also state that they will have a special supply of lubricating oils and gasoline on hand for the benefit of the tourists.

The Touring Committe has made a contract with J. Schreyer for the official programme of the tour. This programme will be in the form of a large booklet, which will be sold in all the cities through which the various routes pass at a uniform rate of 10 cents. This will be the only official programme, and the only one from which a revenue will be derived by the Association at any point, with the possible exception of St. Louis, where programme arrangements have not been completed.

Automobiles for Traveling Salesmen.

The possibilities of the automobile as a conveyance for traveling salesmen have received the consideration of many houses throughout the country since the new vehicle demonstrated its ability to cover long routes, but until within the last year, few houses seemed disposed to adopt the system for canvassing. The extension of this field is now apparent, especially in the West, where conditions strongly favor the use of any means of covering salesmen's routes that render them independent of railroads. The use of an automobile frequently means the solution of the problem of carrying samples, and instances are recorded where enough merchandise of a compact nature has been carried on a vehicle to supply customers along a short route.

In most cases the adoption of automobiles for canvassers has not been established long enough to prove conclusively their advantages over other means of traveling, but hopeful views are expressed that the period of practicability for the automobile in this line cannot be far distant. The following letter from a Wisconsin machine company gives a representative view of the present stiuation:

"Our experience with automobiles for canvassing purposes is somewhat limited. We had only two of them last season, and on account of the condition of trade in the vicinities where they were placed, they were not used to any great extent. This season we have purchased quite a large number, but have not used them sufficiently to know just what has been accomplished by their use. We know that they are very practical when kept in good running order, but it is a question with us whether our men will not spend more time in operating them and keeping them in good condition than by the ordinary methods, thus destroying any advantage that might be gained by their use. Speaking in a general way, will say that we consider them of considerable advantage for country canvassing, if they do not prove too troublesome."

For long stretches over country roads a horse vehicle is generally impossible, and every traveling salesman knows that, next to selling goods, his greatest concern is in making the most economical train connections. Then, the value of the advertising that would be gained by using an automobile in many remote places is not to be overlooked. The Horseless Age would be glad to hear from any houses on their experiences with automobiles for canvassing purposes.

TOURING ROUTES

From the Hub to the Canadian Border.

By N. A. T.

There were five of us, our touring car was a large steamer of the 1904 pattern, and the trip was to take three days. Our faces fairly beamed with anticipated pleasure, and envious eyes looked on, one fine Sunday morning, when at 9.30 a. m. we waved farewell and skipped merrily away toward the north.

From our home we sped along at a good clip through the familiar streets of our own fair city of Malden, out through Medford with its fine macadamized ways lined with attractive residences and shaded by grand old trees, to Arlington. Then keeping the lower road at the fork, we soon found ourselves passing Earl Percy's headquarters in the old days of the Revolution, and other historic sites. Along the same fine roads we entered Lexington, passed the Green with its Minute Man, and taking the lower road, bowled along through the prettiest of country to Concord.

Here we asked directions and were told to follow the State road. We passed between two churches, took our right at the cemetery and continued our way past the bluff which the British once used as a rallying point, through the quaint old town of Bedford, as still on this Sabbath morning as it might have been a hundred years before. In the center of the village we took our left and, catching the spirit of leisure from the lovelorn swains and their sweethearts, whom we met, now and then, sauntering along the dusty way, we rode slowly, drinking in the beauty around us and often "snapping" some pretty bit of nature. We kept straight ahead, through North Billerica, with its splendid farms, across the country to Lowell, entering that city, about thirty miles from our starting point, at 12.15 noon. There we hunted up an old college classmate, but, owing to limited time, we refused his invitation to dine with him and lunched at Page's restaurant, a first-class café, opposite the Runels building, on East Merrimac street. After a brief call and a short spin about the city, we started on, planning to make Concord, N. H., the terminus of the day's run. Our friend took us to the edge of the city, where the state road lay directly ahead of us. For a stretch of perhaps a mile we saw a perfect roadway ahead and for a few moments we realized the full delight of automobiling.

North Chelmsford, a little milling village, lies at the end of the fine stretch of road; still, as we proceeded to Tyngsboro, we had no cause to complain. Just beyond this village we approached a wooded bit, scarcely wider than a lane. Through it we ran leisurely, passing an old meeting house where service was being held and we could hear the organ and the voices, reminding us that modern invention had led us to digress from the path of our Puritan forefathers. The road, winding around the curves of the sparkling Merrimac, gave such delightful vistas of wood and river, and, flecked with light and shadow, was so cool and inviting, we hated to leave it even for the fine avenue which showed our rapid approach to the suburbs of Nashua.

Here we encountered two fellows with a motor cycle (the nosiest one we had ever heard) who passed and repassed us, as if to show the superiority of their machine. They appeared familiar with the road, so we asked, "Is this the way to Manchester?" "Good! That's where we're going," was their only reply, and it has caused us to wonder ever since what they thought we asked them. We did not care to pursue the acquaintance, so, speeding away, left them far in the rear as we slipped out of the city along an attractive street, with more than ordinarily fine homes, into the country once more, headed toward Manchester, eighteen miles away.

As we approached a group sitting under a tree by the roadside, a young lad turned at the sound of our horn, jumped to his feet and made a desperate run toward the horse (probably from some livery) standing at a distance. He reached it just as we passed, and it was impossible to restrain a laugh when we noticed that the animal had not raised its head from the ground where it was feeding. We asked repeatedly of passersby if we were on the best road to Manchester, but tried more than a dozen before we found one who spoke our language—the English. At last, assured we were right, we took advantage of the fine road and in no time at all slipped through the little village of Thornton's Ferry and Reed's Ferry, through shady woods, past meadows strewn on either hand with wild flowers and fresh in their springtime green into quiet Merrimack. Here we stopped to admire the view of the river from the bridge, then hastened on past the little white church, which made us realize we were now most surely among New England's farms and villages.

Delay, caused by a stretch of sand road, was more than compensated by the delightfully cool pine grove on either side, and we were not at all upset by the poor time made. After struggling through a mile or so we thought it best to be on the safe side, so stopped at a Bedford farm house for water. This the farmer seemed glad to get for us, and his negative reply to our offer of pay was followed by this gem of philosophy: "If you don't have a chance to repay me by a kindness, do one for somebody else and we'll call it square." We went away thinking what a good thing for the world if more of us had the spirit of this philosophical farmer.

The Start.

A few rods farther on we met our first real difficulty with horses, and from then on had to stop very frequently. At the top of an embankment, where one leap would have sent both horse and driver to death, we came suddenly upon a team. We stopped the car, and seeing no steam and hearing no noise, the animal, though trembling with fear, was finally induced to go by.

We arrived at Manchester without further incident at 4.25 p. m. Taking on eight

gallons of gasolene, which was the work of about twenty minutes, we resumed our way. A steep grade just ahead, and no start and steam not up, forced us to use our extra pump. But right here I wish to say that during the entire trip we found no grade that our car did not take with ease, and wherever we had a good start the rise would not be realized till we looked back over the way we had come. Only once did we have to put on brakes and make steam before gaining the top, and that was on a sand hill.

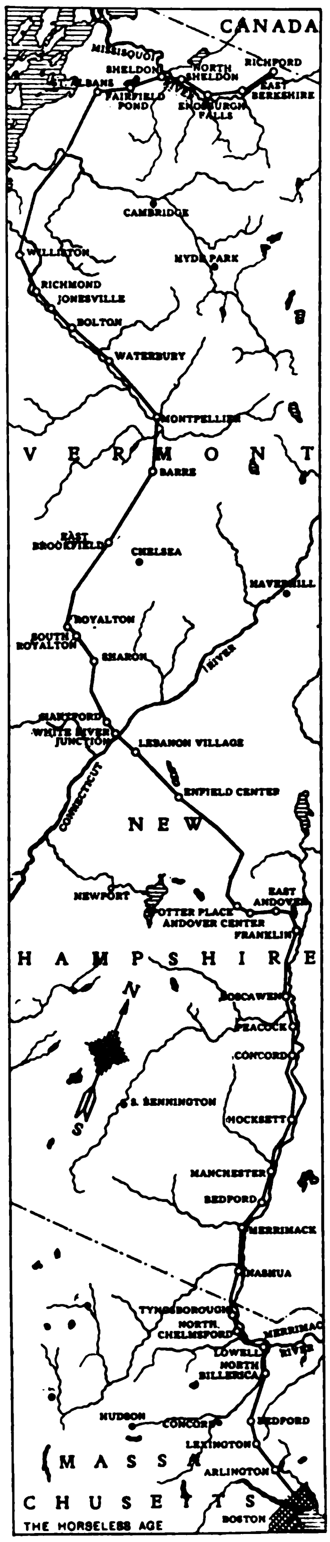
From Manchester on to Concord was eighteen miles of good enough road, and we made a leisurely run, arriving at 6.20 p. m., being a trifle over an hour and a half on the way. Our first village was Hookset, where we slipped along close to the river, through pretty bits of wood, and by prosperous farms. Here we met a frightened horse. The women in haste left the wagon and plunged into the wood by the roadside. However, the driver knew his horse and got by without trouble, thanking us meanwhile for stopping and thus saving him an accident.

A short way along we met farmer No. 2, who called out, "Run that thing out of the road," and drove by with never a word of thanks. These men regard the auto differently.

Past an ideal farmhouse we soon came up a long grade, and from this bluff beheld the finest cross-country view yet seen. We were fascinated by the sight as we gazed over the flower-dotted meadows, and followed the shining river till it was lost among the green of the mountains.

Two of our party, being from Vermont, were accustomed to side-hill farms, but claimed they had seen none in their native state to equal those we were now passing, and declared the farmers must have to wear a stilt on one leg when ploughing.

The approach by a wide thoroughfare to Concord, with its fine homes and imposing business blocks, brings us to the end of our first day's run, about 85 miles. The Eagle is a first-class hotel with prices from $3.00 to $5.00 per day, but we thought they saw us coming and advanced the rates, so ran along to "The Gilmore," a large private boarding house, opposite the Commercial Hotel. Here we found the meals excellent and the house in every way most desirable. Just in the rear is a splendid new garage where, for $1.00, our car was kept over night. The rates at the house were 50 cents for lodging and 25 cents each for breakfast and supper. We were more than satisfied and the landlady was very generous. She gave us an interesting story of the house, which was the residence of former Gov. Stearns, during the days of his administration. Aside from being next to a very historic spot, the site of the Rumford Garrison, No. 5, Lieut. Jeremiah Stickney; rumor says that this famous house has entertained two Presidents, Hayes and Grant, who was given a great reception; two Vice-Presidents, Arthur and Colfax, and their suites. Moreover, Generals Sheridan, Sherman, Logan and Farragut have shared the hospitality of this house and State. Governor Stearns' eldest daughter here married General Brooks and with him



went to Cuba, the first American woman to live in the Palace at Havana. Many relics of the splendor of the house remain. The beautiful cut glass chandelier still hangs in the great drawing room, and a massive mirror with its frame of heavy gold still reflects the faces of visitors.

The start for the second day was made at 8.15 a. m., after we had taken in two and one-half gallons of gasolene, so as to set off with full tanks. North State street was the way by which we left the city, and Franklin, eighteen miles distant, was the first large town we were to make, and some town beyond White River Junction where we could find a good hotel was to end the day's trip.

Our first experience was a nerve-trying one. A tiny child started to cross the road directly in front of the car. The mother saw the danger and darted after it, just clearing the way in time. We slowed down as quickly as possible and yet had an accident occurred, of course. the autoists would have been to blame.

A little way out of Concord we asked an elderly woman who was passing which road led to Penacook. Her only sense was fear, however, as she replied, "I don't know, the horse is afraid, the horse is afraid." As a matter of fact, her sleepy old "nag" was not sufficiently interested to even look at us.

A good speedway follows the car track all the way to Penacook village, where, crossing the river, we kept to the right, finding some hills and some sand, but, on the whole, a good country road. On every hand nature showed her varied green, broken now and then by a farm-house, a sand-hill, or the yellow trail of winding roadway, till we entered the cool, old-fashioned little village which we learned to be Boscawen Plains, and of great interest. Here stands a memorial tablet to the renowned Wm. Pitt Fessenden; just along the street is the birthplace of General John A. Dix, whose stirring words, "If any one attempts to haul down the American flag shoot him on the spot," are familiar to every patriotic citizen of America. A close neighbor is the building in which Daniel Webster opened his first law office and not far beyond is the homestead where he spent several years. In this village we met the first auto we had seen since leaving Manchester.

A prettier farming district it would be hard to find than right along our way to Franklin. We pass. the County Farm at North Boscawen, a spot noticeable for its neatness and its air of good management. The approach, by an avenue of spreading trees, to the State Orphans' Home brings us by Daniel Webster's homestead, his residence from 1800 till the time of his death, and for more than fifty years in the possession of the Webster family.

As we enter, the village of Frauklin is noticeable for its fine broad main street and the very attractive homes, well kept and shaded by beautiful trees which line it. One of our party bethought himself that flags would be quite appropriate on Memorial Day, so we stopped and decorated our car.

Webster Lake lies beyond the village and would have been an ideal spot for a stop had the day been pleasant. It is beautiful

River at North Billerica, Mass.

From the Bridge at Merrimack, N. H.

with its ragged, wooded shores, and we were tempted to hire one of the boats and spend an hour with rod and line.

Near the shore we passed a good farmer's wife standing at the door of her home, and while we prepared for a shower which was just coming on, she was overjoyed to tell us the history of the lake and its association with the life of Daniel Webster, for whom it was named. Perhaps you'll see her as you go by, for she told her story with the familiarity of one who has told it over and over. We left her still talking and almost think she's talking yet.

The shower dampened our garments a trifle (but not our spirits) as we sped on through East Andover and Andover Center to Potter Place, where we stopped for dinner. In spite of the rain we had made nearly eight miles an hour and felt well satisfied. Hotel Potter provided an excellent dinner for 50 cents, and after refreshing ourselves we left at 12.30 noon. Following the advice of an old settler who said the old turnpike over the mountains, built before the railroad, was better than the sand road through Danbury and Canaan, we went up and up through the wildest of country, where we felt sure no auto had ever been before. The road was so narrow that no team could pass, and its sides were carpeted with purple and white violets and waving ferns. Still it was not as rough as we had feared, and though the grades were very steep, with a little help at the pump, our car made no work climbing them. People and horses alike seemed terrified at our approach and here au accident was narrowly averted. A man approaching saw us and motioned for us to stop. Then, throwing aside his umbrella, he jumped from the wagon, seized the bits and tried to hold the horse. The animal reared and throwing him off his feet, dragged him several yards, till stopped by a stone wall. Miraculously the man regained his feet without having been hurt, and while he motioned us to go by, he assured us "it was all right." Another drove his horse straight into the woods and averted a similar experience. Not feeling sure that we had taken the right road at the last fork, we stopped to inquire, but found the houses left in sole charge of watch dogs, the family spending the day in the village probably. At last, in response to our horn, a farmer and his son came down to give us the information desired. The lad could see nothing but the acetylene gas lamps on the front of the car. His question, "How far will they show?" was followed by a still closer inspection, then, "What are they made of?" he asked. The rest of the car was entirely ignored, as he stood, apparently fascinated by the mystery.

A little farther on we met an old fellow driving a farm team. As he slowed up, we noted his wooden leg and the other limb wrapped in a felt and rubber (on May 30th) and heard his remark, "By Goll, I ain't afraid if you be," as he turned his horses toward the motor.

Nearly every one, however, preferred to lead his horse by, and this delayed us so much we were not sorry to leave this wild region and strike once more the level road at Enfield Center. We skirted Enfield Lake, a sheet of water fully as pretty, with its

Roadway Near Homestead of Daniel Webster.

The Road Beyond Tyngsboro.

camps and cottages, as Webster Lake, and as we approached the Shaker Village, with its large stone houses, its common store, its queerly costumed people and its old-time air—once a splendid community, but now divided by lawsuits and dissensions—we were forced to admit the view ahead eclipsed all we had admired before. At the end of the lake a bluff of considerable height rises abruptly. This is clad with green and dotted with little white houses and red barns. Back of it tower the mountains, at its feet lies the lake. The winding road, also, defies our power to express in words its beauty.

While passing along this road we were obliged to "toot" very often, on account of sharp turns. In spite of this we came upon a covered carriage within a distance of forty yards. The horse stopped just long enough for one boy to jump—there were four in the carriage—then wheeled and overturned the vehicle. The lad who had jumped grasped the bits and held the horse while the other boys extricated themselves. Much to our surprise nothing was broken and no one was hurt. Along this road we were obliged to run slowly and stop very often, so lost time.

Leaving Lebanon village we made a quick run to the outskirts of White River Junction, then rolled down a very sharp grade and into the village, about 55 miles from Franklin, at 4.45 p. m. Here we hunted the town over for someone to come and sell us gasolene. At last we succeeded, and putting in seven gallons, crossed to the right bank of the White River, which here joins the Connecticut, and sped away toward South Royalton, Vt. As we cross the line we fancy the scenery becomes more rugged, and, as we enter the State, we realize, too, that we are at last in the land of the covered bridge. The road is splendid and close to the river bank to West Hartford; then, as we leave Hartford, the highway rises above the stream and then suddenly drops again, giving us a varied prospect.

Seeing a team coming we stopped. "Go on—Oh! he's seen hundreds of 'em," was the unexpected reply from this new type of farmer, the "can't phase me" kind. One man we came to had bought a car and wanted to stop and chat. Later on we met a procession of five teams, some of the horses inclined to be afraid. One woman, against her husband's wishes, got out and took her children. As she passed she looked up at us and said, "I don't want my boys killed." And we appreciated her feeling.

We here stopped to locate a click "under the bonnet," but found it to be only a trifling thing. A spring did not do its full duty, so we aided it by a bit of wire and in a twinkling were off again.

(To be Concluded.)

It is now estimated that there will be 370 cars in the tour to St. Louis.

LESSONS of THE ROAD

Seven Thousand Miles in a Runabout--Cold Weather Troubles.

By Dr. Daniel Longaker.

For a few weeks the cold and snow of the past winter forced an acknowledgment of defeat; the little runabout ceased its daily trips, because the electric cars were cheaper and more comfortable, though perhaps slower.

If it be wise to prepare for war in time of peace, it must likewise be a good rule to prepare for cold weather in the summer time, when automobiling is the subject of discussion. In order to do so intelligently, one must have an exact comprehension of the causes of the troubles which beset us.

FREEZING OF WATER SYSTEM.

The principal ones have their origin in the very efficient water cooling devices that have been adopted. The better these meet the needs in hot weather, the more liable are they to lead to trouble in cold. The present runabout has a comparatively small water tank, a large copper-finned radiator and a good pump. The radiating coils are located vertically, in an exposed position. The cooling effect is most thorough and complete even in hot weather, and it is impossible to boil the water when all is going well, even on long continuous running. My earliest machine, on the contrary, had a large water tank, but neither coils nor pump, and yet it cooled fairly well, even on long runs in very hot weather. In cold weather, its advantages were manifest. Although it often stood outside after operation literally for hours, in temperatures 'way below the freezing point of water, it never once froze in any part of its circulating system. Neither calcium chloride nor glycerine were ever used in it. In one season the little runabout used forty pounds of calcium chloride, the radiating coils froze up four times, and the car was out of commission two weeks. Yet it did run in zero weather.

CALCIUM CHLORIDE.

To fill the system required two gallons of water, ten pounds of calcium chloride and some heat. It is a rather dirty and tedious job. Late in November, as the temperature was dropping below freezing, I stopped at a wholesale druggist for the anti-freeze chemical. We had been out all day and experienced no trouble, but this last stop was a little too long. I was soon made aware of the presence of ice in the radiator by the unusual heat that was developing under me, and by the odor of burning rubber in the air. Turning off the current, there was the inevitable preignition and an effort of the engine to run reversely. In stopping under these circumstances it is wise to hold the compression relief cock open. Removing both deck and ventilating tail board, and having occasion to make several more stops, I reached home without excessive heating of the engine, running up the grades without much pounding. This was the second freeze-up during the season, the first having occurred a few evenings before, while the boy had allowed the machine to stand outside a little too long. He made a five-mile run notwithstanding.

The first anti-freeze solution did service for about two weeks, when I was informed one morning that calcium chloride was a failure, and that the water had frozen up in spite of it. Sure enough, the tank was steaming and the radiator was cold! The boys concluded it must have frozen. An hour later I found two of them diligently at work with a gasoline torch, trying to thaw out an empty radiator! Opening the pet cocks under the pump and engine, it was found that all of the circulating fluid had vanished.

Our experience with calcium chloride may be summed up as follows: The solution is a little dirty and troublesome to prepare; it is efficient as a non-freezing liquid, but is impossible to keep in the system long, as it has a way of getting out. It appeared harmless to the tank and tubing, but it was not found possible to keep the pump packed so as to prevent a leak at that point.

CIRCULATION TROUBLES.

The following troubles developed during this period, some of them directly traceable to freezing, while others may have been due to the overheating consequent on non-circulation. A leaky gasket was detected on attempting to start up in the garage one morning. There was no trip that day. On repacking, the engine started promptly and ran quite well for a short time, but out on the road it would barely drag along. Standing a little while, it would start nicely, but as soon as it warmed up it would again lose power. I thought I detected failure of compression from imperfect closing of the valves, but "grinding in" produced no better results. On consulting the agent's repairman, I was promptly told there was a crack in the engine head extending through the exhaust valve guide up into the seating surface of this valve. While cold, the break could hardly be seen, but the heat consequent on operation caused sufficient expansion and widening of the crack to seriously impair compression. The engine would run without developing power. A new head was promptly supplied, and the old one was returned to the factory. While a bill of $25.00 was rendered for the new part, a credit for the same amount was soon received. Thus the renewal cost little, either of time or money. The engine had been very hot on at least four occasions, and, as has already been suggested, this over-heating may have caused the break.

The pump was again leaking, and very soon all of the non-freezing solution was gone. It was replaced, and the system

again filled up, with no better results. A new shaft was finally put into the pump, and still there was a little heat. Thus the cold season wore on, and finally we dispensed with the chemical solution. While the radiator froze four times, it sprang a leak only once. This was permanently remedied by soldering.

At 4½ cents a pound, the money paid for calcium chloride was an insignificant item, and the price is in sharp contrast with that demanded by an automobile dealer four years ago, viz., 30 cents a pound. But cheap as it is now, this plan of preventing freezing will never be very popular. This much I venture to predict.

PUMP AND COIL CUT OUT.

Glycerine is a little to expensive. It is hard on rubber tubing. It must be in concentrated solution. A few years ago a twenty per cent. solution congealed in the radiator of another machine. My final expedient proved best of all, and consisted in cutting out the pump and radiating coils. For short runs this proved quite satisfactory, but the tank is too small for continued operation even in cold weather. With the provision of a tank of greater capacity this machine will operate well with thermo-syphon circulation. There will, however, be the bother of repeated emptying and filling of the tank should the machine stand over night in a garage where by any chance the temperature may reach the freezing point.

The dirty grease-soaked rubber tubing merits a word of condemnation. It requires rather frequent renewal, and initial cheapness is perhaps its only redeeming feature. My worst automobile had the best circulating tubes; but for the badly connected chain driven pump, its circulation would have been perfect. These tubes were copper with ground joints that never leaked. They were also very light and readily kept clean, in sharp contrast with rubber. There was no annoyance, no replacement. But their initial cost was perhaps greater than that of the garden hose, commonly thrust on us.

I am assured from conversation with many of my friends, that the sentiment in favor of air cooling for runabouts is very prevalent and very strong. The final solution of the cooling question and winter troubles consists in the abolition of the water system.

OTHER TROUBLES.

There may be other sources of trouble in operating in very cold weather, but as compared with this one they are insignificant—not worth mentioning. I may say, I know none. Aside from occasional trouble in starting on a cold morning, a gasoline engine operates just as well, perhaps better, at zero than at a hundred degrees. Lubrication may require a little special attention, but this is a trifle. The water in the thin layers in the exposed radiator is the great cause of trouble. Perhaps we shall have an engine that is water cooled in summer time and air cooled in winter. This ought to be easy of attainment. The adoption of air cooling will be the longest step in the attainment of that simplicity—all desire so much. It will mean a lighter load; less repairs; no pump or tubing to leak, and, most important of all, no possibility of damage consequent on freezing of the cooling water in winter time.

AIR COOLING.

Moreover, air cooling has passed the experimental stage, I believe. I am inclined to think its next successful embodiment will be a compromise of the present extremes, eliminating the great weight of the prominent single cylinder car and the complications of the multi-cylinder type. The average man and the physician are in quest of a single or double cylinder light air-cooled runabout. Its weight ought to be considerably under a thousand pounds. It must be well muffled and as quiet in operation as the popular runabout whose failures have furnished the text of the present paper. The feature of great weight is the most objectionable of all. When combined with even moderate speed, the expense for tires will be more than the average man will long stand, and when high speed and great weight are combined, the tire expense will make even the wealthy pause.

The ideal runabout of the future therefore must be light. I am inclined to think it ought to be shaft driven; there are many good reasons why it should be air cooled. The answer, "they have not adopted this system of cooling in France" is no argument at all against it.

CLOSED TOP FOR WINTER USE.

A word of protest against the open hood and the auto entirely devoid of a top. I have often felt that nothing could be more unsuitable than this sort of carriage for the bleak, windy, dusty and cold days of the winter time. It is certainly dirty if not dangerous to expose one's self thus, and the great desideratum is a completely closed top. After much exposure and suffering during four winters I can speak feelingly on this particular phase of the subject.

The mater of housing is important in winter time especially, and there must be some source of heat for the cold days and nights. The little box-like buildings that one sees here and there are as a rule unsuitable, because they are inadequately lighted and without provision for artificial heat, while in hot summer weather they are too hot. Steam or hot water offers the ideal source of heat, although with care in handling gasoline outside only, there is no great objection to a stove. We have depended on this source of heat with satisfactory results during several winters.

A. C. A. Adopts Resolutions Against Grade Crossings.

At the meeting of the Board of Governors of the A. C. A. on June 28, the following resolutions were adopted:

Resolved, That the attention of the Honorable George B. McClellan, Mayor of New York, be called to the numerous grade crossings now in the City of New York, and particularly to those which are not protected by gates; and to the fact that a few weeks ago a serious accident occurred in Van Cortlandt Park, because there were no gates, and that the Mayor be requested to use his influence to do away with the grade crossings in the City of New York, and that as this cannot be done at once that all crossings be as soon as possible provided with gates."

Resolved, That the Governors and Members of the Automobile Club of America thank the Honorable L. F. Haffen, President of the Borough of the Bronx, for his bringing about the paving of Jerome avenue with asphalt from the Central Bridge to 185th street, and particularly for doing away with the very objectionable cross walks where the avenue is being re-paved; that the attention of the President be called to the condition of Jerome avenue north of 185th street, and particularly in the vicinity of the new reservoir. At some points near the reservoir the macadam has disappeared entirely; at other points the road is full of holes and is dangerous; that President Haffen be requested to have the portion of the avenue referred to put in proper repair so that a continuous drive over good road can be had from New York City to Westchester County, via Jerome avenue."

There were also adopted resolutions of the following form, which will be sent to John F. Ahearn, L. F. Haffen, Joseph Cassidy and George Cromwell, presidents, respectively, of the boroughs of Manhattan, Bronx, Queens and Richmond:

"*Resolved,* That the attention of the Honorable ——— ———, President of the Borough of ————, be called to the numerous grade crossings in ———— Borough, and that he be requested to use his influence to do away with these crossings as soon as possible, not only because of the danger to those driving automobiles, but the danger to the users of horse-drawn vehicles and foot passengers; that inasmuch as this improvement cannot be completed at once that the Borough President use his influence to cause the erection of gates at all crossings which are not so provided in the Borough of ————."

New England Motor Omnibus Line.

The London & South-Western Railway Company has commenced a motor-car service between Chagford and Exeter. The car used is strongly built, and capable of carrying 20 passengers, all inside, the roof being reserved for luggage. It is similar to other cars which the company is running between Croydon and Sutton.

BEGINNER'S PAGE

The Contact Maker—Ignition Connections.

The vibrator coil as described in the two previous instalments of this series will produce a continuous series of sparks as long as it is connected in circuit with the battery. But it is only necessary to produce sparks in the engine cylinder for a short fraction of the time of each cycle, at about the end of the compression stroke. Operating the spark coil more than necessary simply results in waste of current and in undue wear on the contact points, and to obviate this we must use a switch or contact maker by which the coil is connected in circuit with the battery whenever a spark is required, and disconnected again as soon as the charge has been fired. This contact maker must evidently be operated by the engine itself. It must be so arranged that the time of making contact, or of establishing connection between the battery and coil can be varied, with relation to the engine cycle; that is to say, the device must be adjustable so that the first spark can be caused to occur either before or after the piston has reached the end of the compression stroke.

A simple design of contact maker is illustrated in Fig. 1 herewith. A represents a shaft driven from the engine crank shaft by positive gearing at one-half the speed of the crank shaft. The shaft A is supported in bearings either integral with the engine frame or secured to it. Upon this shaft is secured a disk B of insulating material, say hard rubber or red fibre. This disk is provided with a segmental metal plate C which is in metallic connection with the shaft A and consequently with the frame of the engine. An electric conductor metallically connected to a large mass of conducting material is said to be "grounded" to it, and the strip C is, therefore, grounded to the frame of the engine. The disk D is supposed to be rotating in the direction of the arrow.

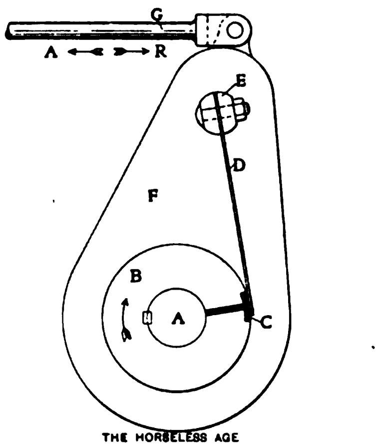


FIG. 1—CONTACT MAKER.

Upon the disk B bears a flexible metal strip D clamped in the stud or post E rising from the plate F. The plate F consists of insulating material, hard rubber or fibre, and is pivotally supported on the hub of the bearing for shaft A, so that it can be rocked around the center line of shaft A in either direction. To this end it is provided with a lug at its upper end to which is pivoted the forked end of a rod G.

This contact maker is inserted in the circuit comprising the battery and the primary winding of the coil, by opening this circuit at one point and connecting one of the ends of the wire to the post E and the other to some point on the frame of the engine. It will readily be seen that when disk B is in such a position that spring D bears on segment C the circuit is completed, as the current can then flow from the engine frame and the shaft A through segment C to spring D and post E. It will also be seen that when rod D is moved to the left or in the direction of arrow A the contact at the segment C will be established earlier in the revolution of disk B, and when rod G is moved to the right the contact at C will be established later. In the first case ignition is said to be advanced, and in the second case retarded. In this manner the time when sparking in the cylinder begins can be regulated by the contact maker. A number of different constructions of contact makers will be described in our next issue.

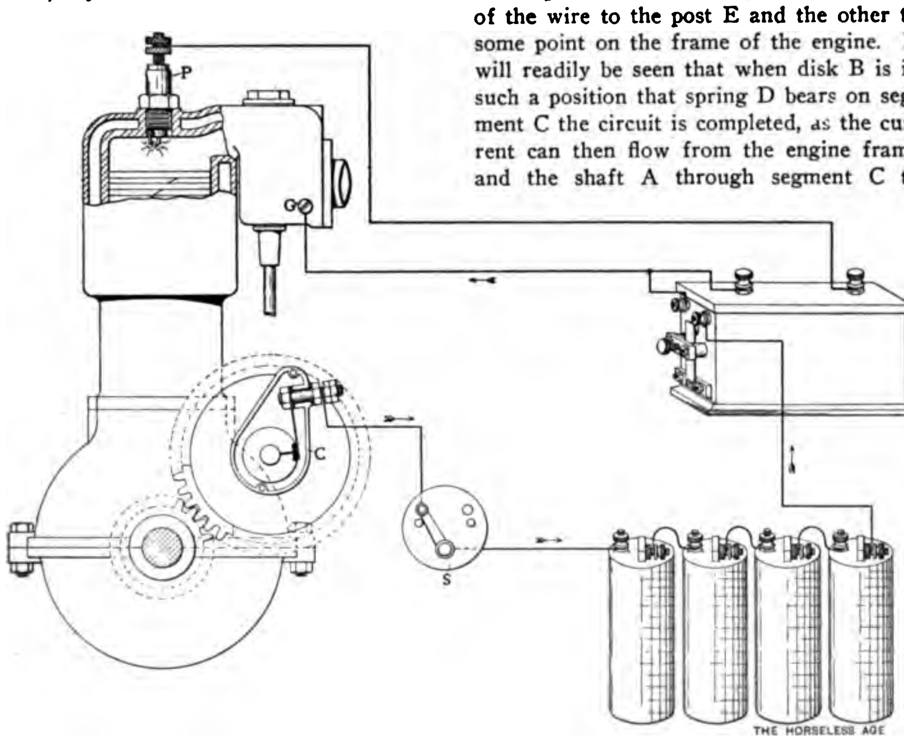


FIG. 2—IGNITION CONNECTIONS FOR SINGLE CYLINDER ENGINE WITH VIBRATOR COIL.

In Fig. 2 is illustrated a wiring system for a single cylinder engine, using a vibrator coil. Switch S is introduced in the circuit to allow of readily stopping the engine by cutting off the ignition current. This switch must first be closed when the engine is to be started. In the drawing the switch is shown in the "closed" position.

The direction of current flow in the primary is indicated by arrows. It will be noticed that one of the primary terminals of the coil and one of the secondary terminals are grounded to the frame of the engine at G, through a common wire. The other secondary terminal connects to the spark plug P, and the other primary terminal to one of the terminals of the battery. The other battery terminal connects through the switch S to the binding post of the contact maker C. The blade or spring of the contact maker is shown to make connection with the segment on the contact disk, so that a current would now be flowing through the coil and a spark be produced at the points of the plug. The direction of flow of the primary current is as follows: From the right hand terminal of the battery to the primary winding of the coil, through this winding and the vibrator to the ground at G, through the engine frame to the shaft on which the contact maker disk is located, through the contact maker to the switch and back to the left hand terminal of the battery.

With engines with more than a single cylinder either a single coil may be used or one coil for each cylinder. Both methods are in practical use, although the latter largely predominates. In a two-cylinder engine, if only a single coil is used the contact maker disk must be provided with two contact segments, so that the current is sent through the coil twice for every revolution of the disk. If the two cylinders are so arranged that the time intervals between explosions are equal, the two segments must be arranged exactly opposite each other at the circumference of the disk. In this way current will be sent into the coil whenever a spark is needed in either of the cylinders. There are two methods of connecting the secondary terminals to the two spark plugs. One consists in connecting each of the secondary coil terminals to one of the spark plugs. In that case the secondary circuit is not grounded. In that case a spark is produced at each of the

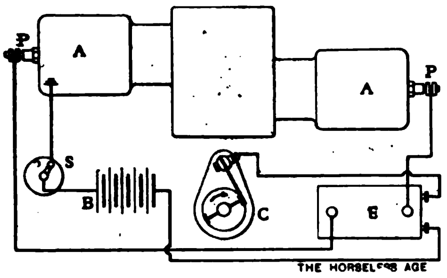


FIG. 3—IGNITION CONNECTIONS FOR DOUBLE CYLINDER ENGINES WITH PLUGS IN SERIES.

plugs every time the current is sent into the coil, or once for every revolution of the engine crank, although a spark is needed in only one of the cylinders at a time. But there is no harm in a spark in the other cylinder at this time, as in that cylinder the exhaust stroke is being completed, and there is nothing to be ignited by the spark. This arrangement has the advantage of simplicity, but requires a slightly more powerful coil than the other possible method.

This method consists in grounding one of the secondary terminals and connecting the other secondary terminal of the coil alternately to the two plugs by a change-over switch or commutator operated by the engine. The commutator may be located on the same shaft as the contact maker, and close to it. When two coils are used with a two-cylinder engine a contact maker with two brushes is required, one of the brushes being connected in circuit with the primary winding of one coil and the other brush

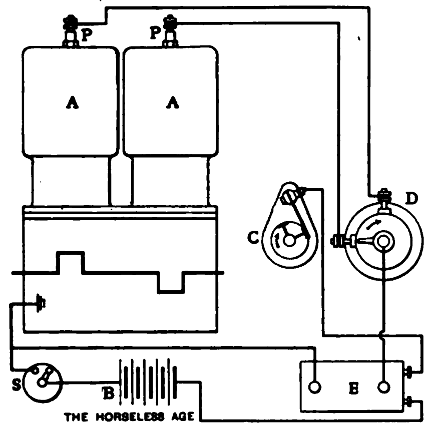


FIG. 4—TWO-CYLINDER ENGINE, SINGLE COIL AND COMMUTATOR.

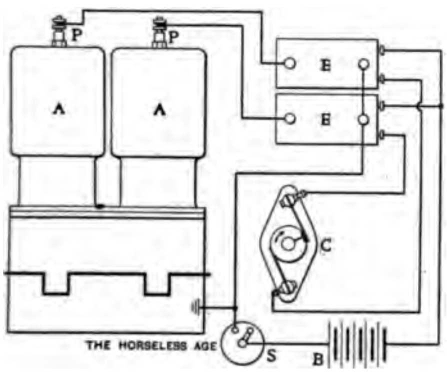


FIG. 5—TWO-CYLINDER ENGINE AND DOUBLE COIL.

with the primary winding of the other coil. The two brushes must be arranged either exactly opposite each other, or at quarters, according to whether the two cylinders are arranged to explode at even intervals or unevenly. One of the secondary terminals of each coil is grounded to the frame, and the other secondary terminal of each coil connected to one of the spark plugs.

With four cylinder engines four coils are usually employed. The contact maker has four contact brushes or stationary contact parts, each of which is connected in circuit with the primary winding of one coil. One secondary terminal of each coil is grounded to the engine frame and the other secondary terminal connected to one of the spark plugs. One primary of each coil is connected to one terminal of the battery and the other terminal of the battery is grounded to the engine frame.

A four-cylinder engine can of course also be sparked with either one or two coils, but in either case a commutator for the secondary is required, similar to the commutator described in connection with the two-cylinder engine.

In the diagram, A represents the cylinder; B, the battery; C, the contact maker; D, the distributor or commutator; E, the coil; P, the plugs, and S the switch.

MAINTENANCE AND REPAIRS

[Suitable contributions to this department, accompanied by sketches, are solicited and will be well paid for.]

Ignitions Connections and Switches

By THE "TROUBLE MAN."

An acquaintance who owns a machine equipped with a powerful double cylinder engine of the opposed type, experienced difficulty in governing it to run slowly enough when the machine was standing. If he arranged the adjustments so that the motor was slowed down as much as desirable with the throttle closed, the full power of the engine was unobtainable with the utmost advance of which the throttle lever was capable. In order to secure full power while on the road, it was necessary to regulate matters so that the engine ran very briskly when no clutch was in—so fast, indeed, as to be very annoying and to consume a large amount of gasoline.

The spark plugs of this motor are wired in series from a single coil, so that both cylinders receive a spark whenever either one of them is ready to explode, and it was found that if one of the plugs was short circuited, so that no spark could be produced at its terminals, the engine, deprived of the power of the cylinder thus cut out, would run at a speed not at all objectionable when idle. A single pole switch of the type known as the "baby jackknife," having a porcelain base and terminals which are widely separated when the switch blade is withdrawn, was mounted on the dash and so placed that it was "open" or "off" when the switch handle was down. This obviated the possibility of its being accidentally closed by gravity. Two wires, insulated the same as the rest of the secondary wiring, were led to this switch, and one of them connected to the head of the plug which was to be cut out and the other to an accessible portion of the motor frame. When the switch is closed, the current passes through it, instead of jumping at the plug, and the engine runs on one cylinder and at a very comfortable rate of speed. Although the inoperative cylinder still draws the charge, the speed is so much reduced that there is a considerable saving of gasoline, while the engine is running idle, as well as a great reduction in the noise which it produces.

* * *

A gentleman who runs a double cylinder machine sent in word from a point several miles out on the road, that one of his cylinders would not work and that he could not negotiate the hard hills which intervened between himself and the city. The "Trouble Man" responded with his usual alacrity, and found upon investigation that the trouble was an electrical one. His motor, which was of somewhat out of date style, was ignited by means of two separate coils in the primary, in each of which was inserted a snap switch of the kind used for controlling a small group of incandescent lights. These switches are arranged to make a quick make and break by means of a spring which snaps the contacts into position. On one of these switches the spring had broken and the connection could not be relied upon. One of the cylinders was thus thrown out of action. As the spring could not be replaced, the switch was removed and the wires leading to it were twisted together so as to make a permanent contact. The engine then started readily, with both cylinders running, but there was no way apparent in which it could readily be stopped, and the owner did not care to take the risks involved by his inability to stop the motor in case restive horses were met on the homeward trip. It so happened that the spark coils of this car were mounted upon the dash, within easy reach of the operator. Their case was removed and the run home made in this condition. When it was desired to stop the engine it was only necessary to place a finger upon each of the coil vibrators, thus forcing them out of electrical contact and holding them down until the motor had come to a full stop. The snap switches on this machine have since been discarded, as there is no necessity for their use, since the current which they break is small and of low voltage and as any switch which involves the use of a spring is a source of trouble.

The Gordon Bennett Race.

All the cars entered for the race were at the scene of the contest at least several days before the weighing in, and made practice runs over the course, although it had been announced that this would not be allowed. It is said that Jenatzy went over the circuit forty-seven times before the race, and perfectly knew every turn and danger spot. Quite a number of accidents occurred during these trial spins, of varying degrees of seriousness.

S. F. Edge had bad luck before the race. While making a run over the course in his racer, several days before the contest, the crank shaft of his engine broke, and although the Napier stand was provided with many minor spare parts, it had no extra shaft. Word was at once sent to England, and a new crankshaft was sent by special messenger, and also a new six-cylinder Napier racer, in case it should be found impossible to repair the damaged machine in time. However, the original car was used in the race, the repair having been effected in good season.

On Wednesday a number of changes in the rules were made, at a meeting of the International Committee. It had been intended in cases where more than one car arrived at control stations simultaneously, not to permit them to resume racing within two minutes of each other. The committee, however, resolved to do away with the interval, and racers arriving simultaneously, were to be restarted simultaneously, or as nearly so as possible. Another change decided upon was that the cars were to be started at intervals of seven minutes, instead of five minutes.

On the day before the race the town of Homburg presented a singular picture of mingled pleasure and business. It seemed to be as crowded with guests as it possibly could be, yet fresh crowds poured in by every train, and lodgings were still to be had at fair rates, the reason being that a large number of the visitors in the streets really were motorists, who after their day upon the course quietly motored off home to their hostelry, perhaps ten or twenty miles away—nothing to a motor, and out of the zone of exorbitant prices. For, in spite of much that had been said to the contrary, Homburg looked to the race for a harvest. The race had driven the best annual customers to Baden-Baden and Marienbad, and the town was certainly the loser in the long run. Fifteen hundred autos were registered at Homburg the day before the race, of which at least one-third were French, and on Wednesday night a caravan of 200 arrived from Paris.

Restauration zur Saalburg.

PRECAUTIONS FOR SAFETY.

The German Automobile Club, which had the arrangements in hand, had been allowed great freedom in its treatment of the course. In parts the road had been widened, in some places the curves had been increased in radius, and at one point the road had actually been diverted to avoid the dangers attendant upon railroad crossing. The severest precautions had been taken to prevent accidents to pedestrians and vehicular traffic using the roads during the period of practice. During the race the approaches of the course were closed altogether. The Club circularized the villagers along the route, warning them of the danger of allowing children to loiter about the roads during the preliminary runs, and informed farmers that it would be better to instruct their drivers to observe the rule of the road—a dead letter in rural Germany. At every corner the trees had been painted white for some distance ahead of the bend—on the left, if the turn was to the left, and on the right if the turn was in that direction—and where no trees existed posts had been planted specially.

Every possible arrangement had been made by the Committee to provide doctors and ambulances, in case of accidents. Thirteen stations had been erected all along the route, and eighteen doctors stood ready, each at his post, to attend the wounded. Each doctor had been provided with a private car and with the necessary surgical appliances. Altogether the preparatory work was well arranged.

General View of the Weighing In.

THE WEIGHING IN.

A heavy rain storm swept over the Taunus district on Wednesday and Wednesday night, but on Thursday, the date of weighing in the cars, the weather was splendid. The cars were weighed at the town weigh-bridge in Homburg, and Edge's Napier was the first to pass through the ordeal scathless. In another respect, however, he was less fortunate, as some

foolish spectator threw down a lighted match when the gasoline tank was being emptied before the car was ready for the scales. Opel's car was also being got ready, and a Mors was just behind. As there was some amount of free gasoline in the gutter, the flames spread instantaneously, and a general stampede ensued among the spectators. Those in charge of the cars, however, stood their ground and put their shoulders to the wheels. In a few seconds the cars were out of danger, and the flames, which had shot up to the top story of the adjoining building, soon burned themselves out. Edge's car was slightly scorched, but in no way damaged.

The majority of the vehicles were brought down to the required weight with considerable difficulty, but all passed muster in the end, though mudguards and even sprags were discarded in several instances. Only one car failed to show up at the weighing in—that of Dufaux, the Swiss entrant, who broke an axle on his way to the scales.


THERY PASSING THROUGH THE HOMBURG CONTROL ON HIS LAST ROUND.

ON THE MORNING OF THE RACE.

Half Homburg stayed up all night from Thursday to Friday, and the other half roused itself at about 4 A. M. to proceed to the starting point at Saalburg, several miles away. The drive through the shady Taunus woods at this early hour was a delight, and ended all too soon by the arrival at the stands where a long day of blinding sunshine and scorching heat was to be faced. The Emperor and Empress arrived at half-past six.

The Saalburg, where the start and finish took place, and where the two large grand stands were erected, is an old Roman camp built at the beginning of the Christian era, and recently restored. Perched on the summit of a hill some thirteen hundred feet above sea level, the circumvallation of the camp demanded a large stretch of country on either side, and from points that may represent the opposite sides of the ramparts one can see northward two miles along the straight but steep road that plunges down the height toward Wehrheim, and southward a mile of similar straight and steep descent in the direction of Homburg. Midway between these points rises the grand stand, which lines either side of the road for about fifty yards. The twin stands are connected at the northern end by an arch, the effect aimed at being to suggest a Roman amphitheatre.


GIRLING'S TIRES BEING COOLED IN A NEUTRALIZED SECTION.

The best point for seeing the race at Saalburg was the small supplementary, uncovered, and unreserved stand placed just on the turn of the hill two hundred yards north of the grand stand. This stand, facing east, afforded a capital view of the start and of the cars gathering speed as they rushed toward the stand and rounded the turn that begins the steep descent toward Wehrheim. Down the slope the eye could follow each car till it flashed behind the overhanging trees half a mile away to emerge into view a hundred yards further on, and dwindle to dimensions of a small black insect on the white thread of a road two miles off, reaching beyond the power of unassisted vision before entering the outskirts of Wehrheim.

THE START.

At a quarter to seven the grand stand showed a large number of empty seats, and at the start only a small gathering of people was present. The start was a somewhat dull affair, the usual preliminary incidents alone relieving the monotony; but the Emperor watched it with great interest, making comments to the Minister of the Interior and the president and members of the race committee.

The first to start, at the sound of a ceremonial fanfare, was Jenatzy, on a Mercedes, the front wheels of which rested just behind the white starting-line, some few hundred yards below the apex of the Saalburg hill, where the grand stand is erected. At one minute to seven Jenatzy adjusted his goggles and seated himself in the car with his mechanician, and shook hands with his numerous friends. As the red flag was lowered, punctually at seven, the car leapt

forward like a projectile shot out of a gun with a roar and a snort. The white Mercedes careered up the hill, rushed past the grand stand, the driver saluting the Emperor with his right hand, and vanished down the hill.

As soon as he was off, Edge looking composed and neat in white oilskins, with a blue cap, brought his car up to the line. He was accompanied by Mr. Napier, who rode in the car with him. At seven minutes past seven the flag fell a second time, and the Napier car flew up the hill, amid cheers from the English present.

At 7:14 Warden (Austria) followed on his Mercedes. De Caters, who was due to start seventh, met with some delay owing to his sparking plug having got oiled, which necessitated his getting down and wiping it. It was not till two minutes after, Girling, the eighth man, had started, that he got off, having thus lost nine minutes. Girling got off well on his Wolseley.

Apart from the misadventure just mentioned, the order of starting observed was that previously arranged, the representatives of the different countries alternating in a set position, as follows:

	a.m.
Jenatzy (Germany)	7.0
Edge (England	7.7
Werner (Austria)	7:14
Lancia (Italy)	7:21
Thery (France)	7:28
Hautvast (Belgium)	7:35
Girling (England	7:48
De Caters (Germany)	7:55
Braun (Austria)	7:66
Cagno (Italy)	8:2
Salleron (France)	8:9
Augieres (Belgium)	8:17
Opel (Germany)	8:24
Jarrott (England)	8:31
Warden (Austria)	8:38
Storero (Italy)	8:45
Rougier (France)	8:52
De Crawhez (Belgium)	8:59

Thery at the Finish Receiving Congratulations—M. Brasier at the Extreme Left.

Soon after the completion of the start the Kaiser, who had been gaily chatting with Ambassador Tower and others near him, returned to Homburg, but he was back in the grand stand in ample time to witness the finish. The course was admittedly a difficult one, and in more than one part actually dangerous, and the majority of the competitors displayed more caution than is ordinarily shown on these occasions.

Jenatzy was undoubtedly the favorite from the commencement, and he justified the popular confidence by finishing first in the first round, but when it was seen that he was practically even with Thery, who had started twenty-eight minutes after him, there was considerable commotion among the onlookers, more particularly as the Frenchman was riding a comparatively unknown car, the Richard Brasier, while the champion, of course, was on a German made Mercedes.

Baron De Caters at the Wheel.

THE FIRST ROUND.

The leading men finished the first round as follows:

Jenatzy (1hr. 26min. 56secs.)	1
Thery (1hr. 26mins. 57secs.)	2
Edge (1hr. 31mins. 44secs.)	3
Girling (1hr. 32mins. 55secs.)	4
Jarrott (1hr. 35mins. 18secs.)	5

On the second round, Edge got into trouble near Limburg with his tires, and started again only after considerable delay. He had been riding well, and his mishap aroused considerable sympathy.

Several others came completely to grief. Opel broke down, as did the Italian Storero, while Salleron was driven into a ditch, to avoid collision with De Crawhez, but fortunately, escaped with no more harm than a severe shaking, and restarted with his machine undamaged.

As the morning wore on the stands rapidly filled. Quite a remarkable feature was the number of English and French present, particularly the latter. In fact, the French language was very much in evidence all day. The grand stand was filled with fashionable spectators, the ladies in their gay summer dresses, and the officers in their uniforms, affording a pretty spectacle. They seemed to take things pretty easily, and to regard the occasion as more of a social function than anything else. From this point of view, the absence of dust, owing to the westrumite used, was a great blessing.

At a quarter to one there was a sort of luncheon interval. The people on the grand stand seemed to have got tired of waiting

in the broiling sun, and Prince Henry and everyone else went off to get some refreshments, all the seats on the stand becoming empty.

The course was lined with people massed behind the netting barriers. There was never any danger to the crowd, although in parts of the course onlookers actually thronged on to the course. All day the restaurant did a splendid trade, as did the peddlers of postal cards with illustrations relating to the races. It was only now and then that anything was seen of the race. From time to time there would come a crash and a roar, and a car would fly past on its mad career, snatching everyone's attention for a moment, and then people would sit down again to light refreshment and conversation.

Thus the day whiled on. It is to be doubted whether people thought it very entertaining, as there was too little to see. The French, however, preserved their interest to the end, and there can be no doubt that they all came to see a Frenchman carry off the cup.

Meanwhile, the race proceeded with certainly fewer mishaps than had been expected. The first circuit was completed by all the cars with the exception of Herr Opel's, this competitor, who was driving a car of his own build, having to retire from the race at Usingen, the first neutral station, owing to a breakdown.

At the end of the second round, Thery, who had been riding superbly, without a hitch, had secured first place. His time from the start, excluding as before, the time spent in the various controls was officially stated at 2hr. 53mins. 43secs.; while Jenatzy, 2hr. 55mins. 29secs., was second; Girling, 3hrs. 7mins. 21secs., third; De Crawhez, 3hrs. 31mins. 11 secs., fourth; De Caters, 3hrs. 32 mins. 52secs., fifth, and Edge, 4hrs. 4mins. 54secs., sixth. In the third round the competitors began palpably to tail off, and it became evident that the race lay between the leading Frenchman and the German representatives.

At the end of the third round Thery was first, 4hrs. 23mins. 40secs., and Jenatzy second, 4hrs. 33mins. 15secs., both times being net.

There were more mishaps in the concluding round, but the two leaders rushed along without a hitch of any kind, and, finally, the cup was won by Thery, whose time for the whole distance net was 5hrs. 50mins. 3secs.; Jenatzy being second, 6hrs. 1min. 27secs. De Caters was placed third, his time being 6hrs. 46mins. 31secs.; Braun, 6hrs. 59mins. 49secs., fourth; Werner, 7hrs. 32mins. 14secs., fifth; Lancia, 7hrs. 17mins. 54secs., sixth; Salleron, 7hrs. 15mins. 3secs., seventh. Jarrott got in at the finish at 7:40, without a governor, and the third speed broken. He had had no tire troubles.

There were no serious personal accidents during the race proper, but quite a number during the several days previous to the event, while the contestants were practicing and other automobilists indulged in promiscuous racing over the course. Some of these accidents came to light only at a late date. It was reported on Thursday that an Italian motorist was killed while driving over the course on Monday, June 13, by the overturning of his car while descending a steep hill. The Italian was found dead, and his body was removed and interred in the cemetery at Homburg as unobtrusively as possible, for fear that the news might mar the prevailing gaiety.

Salleron, the French driver, had a spill on Wednesday afternoon, June 15. He was making a trial run on a Mors touring car at a part of the course in which several sharp successive curves have to be negotiated. At the last curve he appears to have lost control of the car. It left the road and collided with a telegraph pole, which broke off with a snap, and was hurled yards away. Salleron and the other two occupants were thrown out, and severely shaken. Although the car was traveling at only 30 miles per hour, it had a front wheel smashed and sustained other damages.

Another serious accident occurred on Thursday afternoon, June 16, near Saalburg on the first steep hill on the race course. Herr Uhl, a well-known Berlin millionaire, accompanied by Herr Eckstein, of Frankfort, a banker, was running down the hill on a Mercedes which Herr Uhl bought six months ago, when the latter, who was driving, lost control of the car near the bottom of the hill, and ran into a ditch. The two occupants were hurled a distance of ten yards. Herr Uhl fell in a wheat-field, sustaining comparatively slight injuries, but Herr Eckstein alighted on stony ground, and his recovery was considered impossible.

The fatal accident to Baron Von Leitenberger has already been reported in these columns.

The first race for the Gordon Bennett trophy in 1900, was won by M. Charron, France, from four competitors, only one of whom completed the course. In 1901 only four cars started, and M. Girardot, France, was the only one to finish. Mr. S. F. Edge, who won for England in 1902, was also the only driver who completed the course. Twelve cars started last year, and Jenatzy won for Germany. The average rate of speed in the five years was as follows: 1900, 38.66 miles per hour; 1901, 40 miles per hour; 1902, 34 miles per hour; 1903, 49½ miles per hour; 1904, 60 miles per hour.

The Royal Box: M. Brasier Being Congratulated by the Emperor at the Conclusion of the Race.

Of the eighteen starters twelve finished officially in the following order: Thery, Jenatzy, De Caters, Rougier, Braun, Hautvast, Salleron, Lancia, Girling, Cagno, Werner, Jarrott. The six who did not finish were Edge, Opel, Warden, De Crawhez, Augieres and Storero Opel retired in the first round; Augieres in the second; Storero, Cagno, De Crawhez and Warden in the third, and Edge in the fourth.

Most of the mishaps and causes of withdrawals were given in our earlier report, two weeks ago. It was learned that Edge's withdrawal was due to the breaking of the clutch. The only mishap of Théry, so far as is known, was the breaking of one fan blade. To prevent trouble from the thus unbalanced fan Théry immediately broke of all the rest of the blades and ran without fan. Girling's motor stopped in the Homburg control, owing, it is said, to waste in the gasoline pipe, and it took 45 minutes to detect the cause and get started again. Another delay he suffered was due to the breaking of a link in the chain between the motor and the change of speed gear. Jarrott's mishaps were a leak in the

Camile Jenatzy, Second in G. B. Race.

cooling system, derangement of the governor, breaking of the second speed gear, and tire trouble.

In the track races at Frankfort-on-Main on June 18, the event for cars up to 15 H. P. using alcohol as fuel was won by the Cudell Motor Co., of Aix-la-Chapelle. The races for cars up to 14 H. P. and to 24 H. P. were both secured by Opel-Darracq's, while that for cars up to 40 H. P. was carried off by a Mercedes, which type of car was likewise succesful in the tourist race up to 60 H. P. In the last race at Homburg on June 19, M. Opel's Darracq left the track at the corner while going at full speed, skidded around and ran among the spectators. Fortunately nobody was hurt, and the car being uninjured the officials restarted the race.

COMMUNICATIONS

A New Method of Testing Gasoline Motors.

Bound Brook, N. J., June 28.

Editor Horseless Age:

I have read with considerable interest the contributions from Albert L. Clough, which appear from time to time in your publication. In your issue of June 1st, Mr. Clough describes a method of testing automobile motors. The method described is certainly an improvement on the methods ordinarily employed. Where the circumstances will permit, however, a very much more satisfactory method is one which I have recently used for this kind of work. The plan I propose to describe can only be used if the necessary apparatus is available, and it would also be necessary to have an electric current for driving a motor. To make the apparatus complete, it would be desirable to have a bank of incandescent lights sufficient in number to considerably exceed the power of the engine to be tested. The general arrangement of the testing outfit is as follows:

A dynamo is arranged to be driven by a motor and preferably the current from the dynamo should be used in connection with a bank of incandescent lights, as already mentioned. The motor should be arranged to carry a pulley on which a belt from the engine could be used. This completes the testing outfit.

In making the test, the motor should first be started without the belt connecting it with the engine and a certain number of lights should be put into service, and the machines should run until they become heated to their normal condition. Then with the normal voltage of the lighting circuit, the volts and amperes of current consumed by the motor should be carefully noted. Next the belt should be put on the engine and the starting of the motor then drives the engine at a fixed predetermined speed. With the whole plant now in motion, the gas may be turned into the engine and the power developed by the engine will be accurately indicated by the reading of the amperes of current consumed by the motor.

An arrangement of this kind simplifies the testing very greatly, because the engine must run at a predetermined speed, and the usual fluctuations in speed of the gas engine are eliminated. The running of the plant then becomes so stable that it is very easy to carefully note the result of any changes that may be made in the explosive mixture or in the time of the explosion. It is also a very easy matter to measure the efficiency of the engine in the consumption of gasoline, because the running of the plant is so uniform by reason of the steadying influence of the motor that most of the conditions become constant. To make a test of this kind *complete*, provision should be made for three or four pulleys of different sizes to be used on the motor which would cover a considerable range of speed of the gas engine. By repeating the tests with the changes of speed, the results can be easily plotted in curves from which all intermediate points could be easily measured. With curves so constructed the speed of the engine corresponding to the greatest horse power would be accurately determined, and also the speed at which the highest efficiency was realized.

In order to eliminate as far as possible the question of efficiency of the motor under different loads, a motor of considerable size would be desirable, so that the total power of the engine would be relatively so small that the efficiency of the motor would be practically constant throughout the range of power developed by the engine, and when so arranged in testing the gas engine, the difference of efficiency of the motor at different loads could be neglected, for all practical purposes.

I have found this method of testing a gas engine exceedingly satisfactory, and a much simpler test to conduct than one where the speed is constantly fluctuating and where a constant watch must be kept of the volts and amperes of current developed, and, of course, with frequent fluctuations of speed, it is very difficult to determine just what a fair average may be.

I understand perfectly that a testing outfit such as I have described is much more elaborate than the one Mr. Clough has referred to, but it is vastly more satisfactory and much more convenient for getting reliable data than anything else I have ever seen.

F. H. Ball.

More Hayseed Legislation in New Hampshire.

Editor Horseless Age:

The enclosed clipping is taken from the Laconia *Democrat* and shows how many years behind the times the writer must be. It is noticeable that most of these earaches come from towns where no autos are owned. There are three cars in the small town where the writer resides, and there will soon be regulations posted limiting the speed in the village to eight miles per hour, and, furthermore, no horse drawn vehicle is allowed to exceed that limit. By this last clause the selectmen of this town show that the auto has the same right as the horse, and the eight mile limit shows that they are men of broader minds than our rural neighbors who are cutting the limit to six miles.

L. G. Fifield.

The clipping referred to reads in part as follows: Never in their lives did Edwin J. Young, Fred E. Scribner and Charles L. True, selectmen of Northfield, stand so

high in the estimation of the people of their town as to-day. The principal cause of this is on account of their prompt action and stringent by-laws concerning the running of automobiles within the limits of Northfield, so that this town's citizens can now travel upon the highways they have helped build, with some degree of safety. . . . The Council have had notices printed and posted all over town, requiring all drivers of automobiles to come to a full stop when meeting a team, whether signalled or not, and to not run over ten miles an hour anywhere in town, outside the village, and in the village not over six miles an hour. . . . When the old B., C. & M. R. R. wanted to run engines through here they bought a right of way and paid for it; they didn't ask to run up and down the highways, as these motor vehicles are doing, and people are beginning to think if these rich men want to use these concerns let them buy a right of way and build their own roads the same as other folks. There is probably not a man who resides in Northfield to-day but what is proud of the fact. This is a live town and five years ahead of the majority of Down-River towns. We were the first to buy a road-machine, the first to build macadam roads, the first to use snow-rolls, and, thank God, the first to restrict the running of automobiles. We put our best men in office regardless of politics, our taxation is below the average of other towns, and take it all around there is no better place on earth to live than in the town of Northfield, and we are glad we are here.

Chauffeurs' Diplomas.

Editor Horseless Age:

Kindly state in your next issue where the Association Gènèrale Automobile Chauffeurs diploma can be obtained. I read the article on this subject in your recent issue.

M. Potter.

(The office of the above named association is at 8 Place de la Concorde in Paris. The diploma is not required in this country.—Ed.)

Explosive Engine Query.

Editor Horseless Age:

What horse power will a double cylinder 3 x 3 inch engine develop at 400 revolutions per minute.

J. H. Downs.

(From one-half to one horse power. An engine of these dimensions should run at about 1,400 r. p. m.—Ed.)

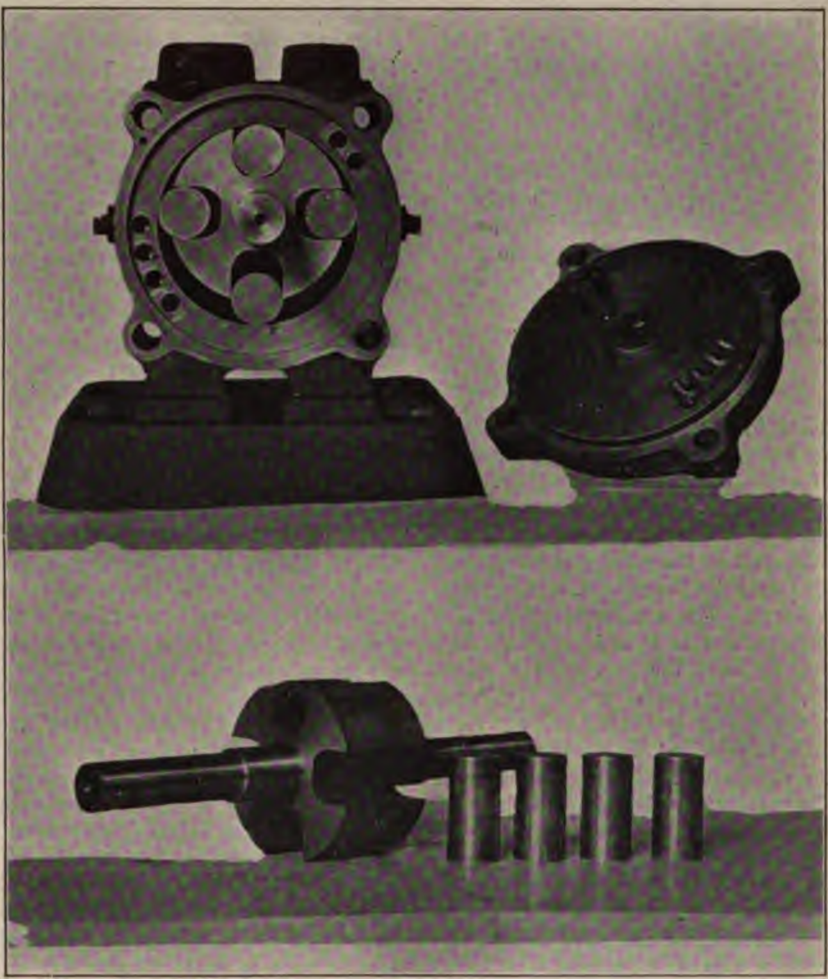
We are informed by the Simms Mfg. Co., Ltd., of London, that of the 18 starting cars in this year's Gordon Bennett race, ten were fitted with the Simms-Bosch magneto ignition, and the first five cars to finish all had this ignition.

New Vehicles and Parts

A New Rotary Engine.

A new rotary steam engine said to be adapted for automobile purposes, is being exploited by the Cooley General Development Co., of Boston, Mass. Like most rotary engines, it is of simple and compact design, and is claimed to be fool-proof. It comprises four roller valves which roll on the interior surface of the cylinder when the engine is in motion, and the frictional loss due to the motion of the slide valve in an ordinary reciprocating engine is therefore avoided in this engine. We are furnished with the following report of a test made on a 10 H. P. Cooley engine at the shops of the N. Y. C. & H. R. R. Co. at West Albany, on March 17, 1904:

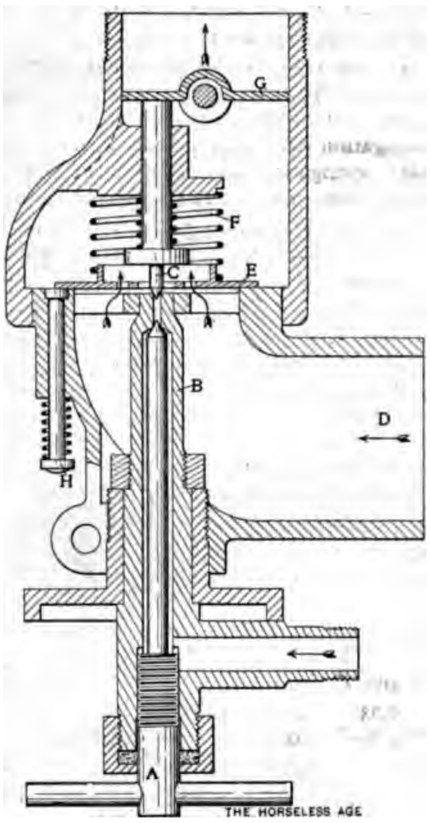
Trial consisted of nine separate runs of one-half hour each, readings being taken every five minutes during each run. The exhaust steam was condensed in a surface condenser, the condensing water caught and weighed after each run. A separator was used to dry the steam, with a throttling calorimeter to detect the moisture present. Readings of the thermometer on this were taken every minute throughout the runs. The developed horse power was measured by a Prony brake, length at arm 5 feet, 3 inches, arm resting on platform scales. First run was made with no load to determine friction and thereafter a load increasing by one pound each run was put on. Duration of run, 7½ hours; boiler pressure gauge average, 98.13; average R. P. M., 1,249; total condensed water, 1,358 pounds; developed horse power, 9.79; length of brake arm, 5¼ feet; mechanical efficiency, 91 per cent.



Parts of Cooley Rotary Engine.

The Rose Carburetor.

A carburetor embodying a number of novel features has recently been placed upon the market by H. Rose, of 148 Mechanic street, Bradford, Penn. It is of the type in which the gasoline is fed directly from the tank to the spray nozzle, without passing through a float chamber, the spray nozzle being normally closed by a needle valve held to its seat by gravity. Feferring to the sectional view of the carburetor herewith, the gasoline feed can be



ROSE CARBURETOR.

controlled by means of a needle valve A passing through the stand pipe B, the upper end of which forms the spray nozzle. The nozzle opening is closed by the needle valve C guided in a bracket extending inward from the wall of the mixing chamber, and provided near its lower end with a cylindrical flange. The air enters at the side of the carburetor at D and passes through openings between the spokes of a spider surrounding the spray nozzle. Directly above this spider is located the air valve E, which is provided with a central opening for the passage of the gasoline valve C and a concentric series of small air openings. The valve E is held down to its seat by a coiled spring F. In the upper part of the mixing chamber is located the throttle valve G, the shaft of which passes through the wall of the chamber and has a lever arm affixed at one end.

The suction of the engine piston during the intake stroke creates a partial vacuum in the mixing chamber above the air valve E and draws the atmospheric air entering at D through the central air passages of valve E. The air thus drawn into the mixing chamber impinges directly against the under surface of the flange on the gasoline valve C, thereby lifting the valve and allowing a certain amount of gasoline to be sprayed into the mixing chamber. The stem of valve C is surrounded with a small coiled spring, referred to as a buffer spring, which limits the lift of the valve.

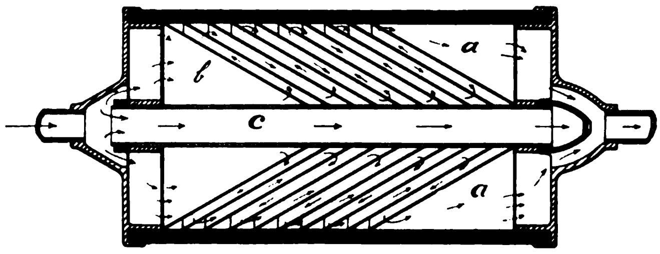
When the engine is running at full speed, the air openings at the center of the air valve E are, of course, much too small to allow a cylinder full of air passing through them in the limited time of a single stroke, and the difference of pressure on the two sides of the air valve E then causes this valve to be lifted against the pressure of the spring F, thus affording an additional entrance for the air into the mixing chamber around the edge of the valve E. It will be obvious from the drawing that the flow of air through the central openings in the air valve alone determines the charge of gasoline admitted, and the passage around the valve E when the latter is lifted from its seat constitutes therefore, in fact, a supplementary air inlet, as used in all modern automatic carburetors.

If it is desired to flood the carburetor, say in starting, this may be accomplished by pushing up the plunger H the upper end of which bears against the under surface of the air valve.

The Ejector Muffler

The Motor and Manufacturing Works Co., of Ithaca, N. Y., have brought out a gasoline engine muffler depending on a new principle. A setional view of the muffler is shown herewith. The action is described by the manufacturers as follows:

The muffler is designed on the principle of an ejector. The flow of the exhaust gasses through the tortuous passages is retarded, not by throttling, but by making the gas travel along a zig-zag path until the flow through the nozzle is sufficiently high to create a vacuum in the chamber *a*. The suction of the nozzle tends to bring the gas forward into the chamber *b*, while the column of moving gasses passing through the pipe *c*, tends to draw the gas after it from the chamber *b*. As the velocity of the gas through the nozzle decreases, the gas left in the muffler, exhaust pipe and cylinder moves forward to fill the partial vacuum in the chamber *a*, where the expansion is rapid, causing the gas to lose a great part of its heat, and to pass off into the atmosphere without noise; reducing the pressure in the muffler before the exhaust valve closes, to slightly below that of the atmosphere.



EJECTOR MUFFLER.

In no part of the muffler are the passages less in area than that of the exhaust pipe and all openings are sufficiently large to avoid filling up with carbon. Excepting the ends, the muffler is built entirely of steel and is exceptionally strong and light.

The muffler has been applied to an engine in the Department of Experimental Engineering of Cornell University, and Professor R. C. Carpenter, of the department, in a letter to Mr. Reid, of the Motor and Mfg. Works Co., states that with this muffler the engine runs practically noiseless and the muffler does not cause any back pressure which can be measured on the indicator diagram.

New Goggles.

John Scheidig & Co., manufacturers of optical goods of 43 Maiden Lane, New York, have recently added two new styles to their assortment of automobile goggles. One of these, shown in the accompanying cut, known as the Gordon Bennett style, is made in aluminum, and bends easily to the shape of the head. This style has a flat glass front, allowing the wearer an unrestricted view. The goggles can be worn over ordinary glasses. The other style is

GORDON BENNETT GOGGLE.

called the Paris-Madrid goggle, which has oval oblique eye cups, which are designed to afford a greater scope of vision. This style is silk lined, with a rubber tube around the eye cups where they touch the face.

Rival Motor Services in Porto Rico.

An opposition automobile service to that now operated by C. H. Martin between Camuy and Aguadilla, Porto Rico, is soon to be inaugurated by Manuel Jiminez, who now operates a horse service on the Island. Mr. Martin is said to have influenced the railroad management to make a change in the schedule which made it impossible for the horse line to carry passengers between the railroad termini in time to make train connections. To meet this opposition Senor Jiminez recently visited the Knox works at Springfield, Mass., and ordered three buses of the same type as those of Mr. Martin, and both will now be on an equal footing to compete for the mail-carrying privilege between Ponce and San Juan.

OUR FOREIGN EXCHANGES

Steel for Change Speed Gears.

An interesting article on materials for sliding gear pinions appears in a recent issue of *Der Motorwagen*, from the pen of Herr O. Thallner, steel works inspector. Herr Thallner gives the results of numerous chemical and mechanical tests of steels actually used in the construction of these pinions, and discussess the desirable qualities in a general way.

The first toothed gear examined, in studying the problem of materials, was of French origin. The chemical analysis gave the following result:

.21% C., .09% P., .42% Mn., .03% Si., .008 S. and .06% Cu..............(1)

The gear was case hardened to a depth of .052 inch. The fracture of the hardened layer was of coarse crystalline grain. The gear showed a good deal of corrosion on the teeth, which had rendered it useless in a short period. A steel of greater hardness would undoubtedly be less subjected to corrosion, a view confirmed by experience.

Another gear wheel tested at a later period, was also of French origin and had broken in use; it had the following chemical composition:

.67% C., .54% Mn., .21% Si., .014% P., .008% S. and .02% Cu............(2)

which indicates an excellently compounded crucible steel. The test of a pressed gear wheel of German manufacture gave the following result:

.45% C., 1.20% Mn., .06% Si., .045% P., .06% S. and .12% Cu.............(3)

The last two gears were hardened all through. The low degree of hardness, as well as the coarse grain of the fracture indicated that the gears had been cemented at a comparatively high temperature.

A further gear wheel, of German construction, was of the following composition:

.84% C., .42% Mn., .06% Si., .018% P., .006% S. and .034% Cu...........(4)

This wheel proved to be of similar quality as No. 2, although it was considerably harder, and naturally also more brittle. All three wheels had broken in use, and Nos. 2 and 3 were much corroded at the ends of the teeth.

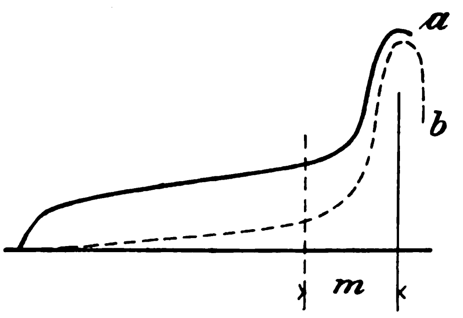
To an expert it is at once apparent that there must be notable differences in quality between the materials of gears Nos. 1 and 4, and that particularly entirely different physical qualities have to be counted with in the two cases, while the materials of gears Nos. 2 and 3 are intermediate between those of Nos. 1 and 4.

As it is practically impossible to obtain from a broken gear wheel test rods for use on a testing machine, the physical qualities of the different materials can only be judged from their chemical composition, and would probably be as follows:

	Breaking Strength.	Elastic Limit.	Elongation.
No. 1.....	68,000— 78,000	39,000—49,000	20—24%
No. 2.....	106,000—122,000	71,000—82,000	16—18%
No. 3.....	92,000—106,000	62,000—71,000	16—18%
No. 4.....	122,000—135,000	82,000—96,000	10—14%

There must have been some reason for discarding the steel No. 1 and adopting No. 4, and this reason is the desirability of a material with the greatest possible hardness, to reduce the wear with increasing working pressures, and to increase the strength of the interior, unhardened portion of the gear wheel. These objects were attained by the choice of the harder steels, Nos. 2, 3 and 4, but unfortunately greater hardness is invariably accompanied by brittleness. If the hardening of the steel (Nos. 2, 3 and 4) considerably reduces the wear, it also introduces a factor of uncertainty, owing to the increased brittleness, rendering the wheels more breakable. The problem then is to compound a steel which shall combine the greatest resistance to wear with a minimum liability of breakage.

Now it is well known that in general the



toughness of iron decreases with increasing hardness and resistance to wear. The resistance to wear increases with the percentage of carbon, but the toughness decreases in about the same proportion. A high degree of toughness is only obtainable with a small percentage of carbon.

The use of metallic alloys suggests itself as a means of increasing the hardness without making the steel brittle, and the following metals would serve to effect this end: Nickel, chromium, tungsten and molybdenum. Nickel is used the most extensively. It increases the breaking strength with increased proportions, and also the ductility. Pure chromium steel is never used for gear wheels, but nickel steel is frequently alloyed with chromium to secure special physical qualities. Unfortunately iron-chromium alloys possess a number of objectionable qualities which render the manufacture of nickel-chromium steel very difficult; chief among these objectionable qualities is a tendency to unexpected brittleness.

A suitable percentage of chromium slightly increases the breaking strength of nickel steel, and alters the phenomenon of flow of the metal, as evidenced by the changes of form prior to rupture. This effect is well shown by the results of breaking tests. In the accompanying diagram, curve *a* represents the elongation of refined nickel steel, while curve *b* represents the elongation of chromium-nickel steel. The total elongation and breaking strength is about the same in the two cases. This effect of chromium is, within certain limits, the more pronounced the greater the proportion of chromium as compared with the proportion of nickel in the steel, and is almost imperceptible in a steel containing a comparatively large amount of nickel, say 4% to 6%, and only a small amount of chromium, say .6% to .7%.

The use of tungsten and molybdenum is impracticable, on account of the high price of these metals.

Following are tests of some nickel and chromium-nickel steels which are used or have been recommended for automobile purposes:

0,17% C, 0,018% P, 0,03% S, 0,45% Mn, 0,20% Si, 4,2% Ni, — Cr..........(5)
0,40% C, 0,023% P, 0,008% S, 0,80% Mn, 0,03% Si, 2,02% Ni, 0,4% Cr........(6)
0,20% C, 0,009% P, 0,008% S, 0,32% Mn, 0,45% Si, 3,5% Ni, 2,4% Cr.........(7)
0,35% C, 0,02% P, 0,07% S, 0,52% Mn, 0,06% Si, 3,1% Ni, —% Cr........(8)
0,12% C, 0,02% P, 0,020% S, 0,21% Mn, 0,09% Si, 0,8% Ni, 0,5% Cr........(9)

Tests gave the following results:

	Breaking Strength.	Elastic Limit.	Elongation.	Contraction of area.
No. 5.........	96,000	78,000	13.5%	62%
No. 6.........	156,000	114,000	10%	40%
No. 7.........	142,000	100,000	8%	20%
No. 8.........	106,000	85,000	14%	40%
No. 9.........	78,000	42,000	25%	60%

If a rod of wrought iron is surounded with charcoal and is raised to a high temperature for a time, the iron takes up some of the carbon and becomes steel at all points to which the carbon penetrates. The depth to which the carbon penetrates depends upon the duration of the process (called cementation), and the amount of carbon taken up, on the temperature, and it seems quite natural to expect the physical qualities of the rod as a whole after cementation to depend upon the carburized or cemented outer layer and the non-carburized inner core. As the physical properties of the former depend upon the percentage of carbon and the molecular structure resulting from the process of cementation, and those of the non-cemented core upon the effect of the heating on its physical properties, the conditions for judging the properties of the cemented rod as a whole seem rather complicated. The conditions are quite simple, however, if the properties are determined by bending tests. Such tests will show that the rod will withstand greater bending the smaller the proportion of carbon, and the lower the depth of cementation, and vice versa. The deeper the cementation the less the ability of the rod to withstand bending, and if the car-

bon has penetrated to several 32nds of an inch, the wrought iron rod is quite brittle, and possesses more the physical qualities of a steel rod.

All iron alloys behave in this same manner, no matter what material the iron is alloyed with, and it would seem from this that if the cementation has to be carried to a considerable depth, in order to obtain great wearing strength, it does not matter what physical properties the original or base material possesses. But right here we have one of the essential qualities for steel for the construction of gear pinions—that it must retain great toughness, even if cemented to a great depth, and that the steel must be capable of great hardness. even if cemented only to a small depth.

If chemically different steels are cemented under the same conditions, it will be found that the effect of cementation is radically different, as regards the proportion of carbon taken up and the depth to which it has penetrated, as well as the structure of the outer layer and of the inner portion. The steel manufacturer therefore has it within his power, to a certain extent, to insure that invariable and satisfactory results are obtained in the process of cementation, even if slight deviations should occur in the process. And uniformity is absolutely essential in the material for these pinions.

Much depends, of course, upon the processes of cementation and hardening, which must be carried out very carefully and in suitable manner.

The question of the most reliable process of cementation has been given much attention in interested circles. The practice of hardening the steel while at the temperature of cementation, has been abandoned, and it is now usual to allow it to cool and then reheat to the correct, mild hardening temperature. If, as is to be expected, the steel has been burned, it is necessary to introduce between the cementation and hardening processes a mild glowing at 700 to 800 degrees C, to fully regenerate it. It is impossible to give more detailed directions, as the details in each case must depend upon the quality of the base material and must be prescribed by the steel manufacturer.

In hardening the gear pinions, it is of the greatest importance not only that the proper portions of the wheels be left hard and soft, respectively, but also that no changes in form are suffered. Never use grades of steel which are claimed not to undergo any changes of form during hardening, as such steels of a quality suitable for gear wheels do not exist. The most important means to prevent changes in form during the hardening process is to harden the wheel from the lowest possible temperature, which is moreover most advantageous for the structure of the outer hardened layer. The hardening can only be thoroughly successful if effected from a temperature below the critical temperature of the base material. It results from this that the critical temperatures of the outer carburized layer and of the soft inner portion must be widely separated, the one being preferably quite high, and the other low.

It was suggested several years ago that special hardening might possibly be rendered unnecessary, and a lot of difficulties connected with the process thus be avoided. Numerous experiments have shown that by the process of cementation alone the steel may be rendered so hard that cutting tools will not attack it and the impression is gained that the material has been hardened. If suitable carburizing agents are used, this natural hardening effect may be obtained with chromium-nickel steel, if it is cemented as usual and allowed to cool slowly in the carburizing packing. The effect is increased if arsenic acid is added to the carburizing agent. Tests of testing rods treated by this process show, however, that the steel thus obtained is of rather poor quality.

The London County Council registered 506 cars and 365 motor cycles from April 20th to June 4th, this making a total number of cars and cycles registered up to June 4th, since the commencement of the year, of 3,420 and 2,428 respectively. During the same period 1,338 licences to drive cars or cycles have been issued, and 17 general identification marks for motor cars assigned to manufacturers or dealers, making the total number of licences for the year to that date 8,533, and manufacturers' identification marks 264.

The Royal Mint at Bangkok, Siam, is in the market for a motor wagon for the transfer of ingots, coin, etc., up to one ton. It must have a speed up to 10 miles per hour and ascend grades of 20% at eight miles per hour. A hood must be provided for the driver and his companion, and a step in the rear for an official. The box behind the driver's seat, to carry the coin, etc., should be 3 feet square and 18 inches deep, and have a lid lifting vertically, and a tail board. Only steam and gasoline power will be considered and Sumatra petroleum must answer as fuel. Communications should be addressed to J. W. Hinchley, H. S. M. Royal Mint, Bangkok.

Better Protection of Grade Crossings.

As a result of the accident to Mr. and Mrs. George Dixon, whose automobile was struck by a train on the Aurora, Elgin & Chicago Railroad, as reported recently, the Chicago city council has ordered the railroad company to immediately elevate its tracks through the section where the accident occurred, and pending this elevation to station flagmen and provide gates at all crossings on its line in the city. This prompt action might well serve as an example to New York City officials. The fatal accident at Van Cortlandt Park recently has been the subject of an investigation by the State Board of Railroad Commissioners, but we are informed that the report will not be submitted in Albany until late this month. It is doubtful if any drastic action will result from the board's inquiry, for the board is inclined to refer authority in the case to city officials under the section of the law which provides that "At any point where a railroad crosses a street, highway, turnpike, plank-road, or traveled way at grade, or where a steam railroad crosses a horse railroad at grade, and the corporation owning or operating such railroad refuses, upon request of local authorities, to station a flagman or erect gates, the Supreme Court or the County Court may, upon the application of the local authorities and upon ten days' notice to the corporation, order that a flagman be stationed at such point, or that gates shall be erected thereat." The question of providing gates for this particular crossing has, we are informed, been under consideration in the past, but the objection of the Park Commission that gates would mar the scenic attractiveness of the park was sufficient, it is stated, to keep the crossing without protection.

Another dangerous crossing in this vicinity is on the rapid transit road at Croaks Crossing, Giffords, Staten Island, where an automobile was recently run down by a car. This crossing is at the bottom of a hill, and a deep cut shuts out the sight of approaching trains. The only means to warn persons of danger is said to be an electric bell, which on this occasion proved wholly inadequate. The owner of the vehicle and his companion succeeded in saving their lives by jumping. The automobile was thrown 100 feet and completely wrecked.

Trade Literature Received.

Pope Mfg. Co., Hartford, Conn.—Catalogue of the Pope-Tribune car.

B. Morgan, Rhinebeck, N. Y.—Circular of Morgan's one part automatic admission valve.

International Acheson Graphite Co., Niagara Falls, N. Y.—Catalogue of Acheson graphite.

Billings & Spencer Co., Hartford, Conn.—Circular of standard drop-forged rod and yoke ends.

W. E. Metzger, 265, 267 and 269 Jefferson avenue, Detroit, Mich.—"The Care of the Automobile." (A booklet on Mr. Metzger's garage and agency business.)

F. Hiorth, Christiania, Norway.—Catalogue of automobiles (American, German and French), boat motors and cycle motors.

lub Notes

YORK A. C.

ı members of the York, Pa., Auto-
:lub recently gave a demonstration
ge number of the City Councilmen
ıfety and ease with which automo-
ı be operated at a higher rate of
an that provided for in the ordi-
iz., seven miles per hour, with the
: having the limit raised.

A. C. A.

neeting on June 28, the following
cted to membership in the Auto-
Club of America: Active, T.
r Sloane, Nelson Robinson, Albert
lhart and Walter Ferguson, Jr.,
York City, and E. J. Conill, of
Cuba; associate, John Markle, of
ı, Pa., and George Fales Baker
ard T. Davis, of Philadelphia.

KANSAS CITY A. C.

ecent meeting of the Kansas City
utomobile Club, 20 new members
nitted, bringing the membership to
ıaking the club the largest west of
ouri River. A legislative commit-
ıding H. N. Straight, L. C. Boyle
J. Huttig, was appointed, and ef-
l be made to secure an increase in
l limit from 8 to 10 or 12 miles an

DALLAS A. C.

ıtomobile owners of Dallas, Tex.,
anized under the name of the Dal-
mobile Club, and have elected the
; officers: John G. Hunter, presi-
. J. Kiest, vice-president; G. R.
secretary; J. D. Schofield, treas-
ınry Garrett, managing director.

A. C. OF DAVENPORT.

been decided to incorporate the
ile Club of Davenport, Ia. Offi-
directors have been elected as fol-
'resident, Sam T. White; secre-
H. Ruebsam; treasurer, B. L.
directors, Sam T. White, A. H.
, B. L. Schmidt, Dr. A. L. Hage-
'. D. Peterson, F. L. Bills and T.
ı. The following committees were
ed; Membership, J. E. Burmeister,
ntin and R. N. Carson; executive
e, Sam T. White, A. H. Ruebsam
Schmidt, being the president, sec-
d treasurer of the board; auditing
e, P. Fedderson, J. C. Duncan and
sen; entertainment committee, Dr.
:k, George A. Gould and J. Goos.

New Incorporations.

ll-Briscoe Motor Co., North Tar-
N. Y., to manufacture motors and
Capital, $750,000. Directors: Richard Irvine and Nicholas Betzeman, New York city; Isaac C. Kirkham, New Brighton, L. I.; Henry H. Tobey, Brooklyn; Walter B. Horn, Hollis, L. I.

Bowman Gregg Co., Springfield, Mass., to manufacture motors. Capital, $3,000. Directors: George W. Bowman, William M. Gregg, Belle Y. Bowman and F. G. Wooden.

Motor Cycle Endurance Contest.

There were 23 starters in the first day's endurance run of the Federation of American Motorcyclists which began last Saturday from the headquarters of the New York Motor Cycle Club in West Sixtieth street. Twenty reached Albany, and of the 19 who started on the return trip to New York, 17 reported at the rendezvous within time to qualify for the 1,000 points award. Among those who finished on time was Oscar Hedstrom, of Springfield, Mass., who accidentally wounded himself in the arm while attempting to shoot a dog that was chasing him. The third day's event in the series of contests was the fuel consumption test, with a quart of gasoline over a route to the end of the Lafayette Boulevard and return, over the course as long as the fuel lasted. Edward Buffum, of Boston, covered the greatest ground, over 55 miles. A remarkable part of his achievement was that he rode the last five miles on one pedal, having been the victim of a collision which broke the other pedal and caused injuries to the rider which necessitated his removal to a hospital after he had finished. The result of Mr. Buffum's test brought the cost of fuel to less than a mill a mile, basing the cost of gasoline at five cents a quart. Tuesday's events consisted of a hill climbing contest at Fort George and starting, stopping and slow speed tests at the foot of the hill. Another endurance run will be started to Cambridge, Md., requiring two days. The night stop will be at Wilmington, Del. The terminus of this run will be the scene of the federation race meet on July 8 and 9. Prizes and awards will be given at the close of the events.

New Non-Stop Record.

F. A. La Roche and A. J. Picard made a trial for a non-stop record over the New York-Boston and return route last week, in a Darracq touring car. They claim to have run a distance of 1,053 miles without stopping the engine. The stop at that point was caused by a frightened horse which upset a buggy. The start was made from New York at six o'clock Sunday morning, June 25, and the double round trip completed at quarter past one o'clock Wednesday afternoon. It is stated that a detour was made between Hartford and Worcester to bring the total distance of the two round trips to 1,133 miles. The average speed of the whole run is said to have been 17 miles per hour.

MINOR MENTION

The Western Rubber Co., Goshen, Ind., has entered into a contract for the manufacture of B-OK tires.

The Gutta Percha and Rubber Manufacturing Co., Toronto, has been licensed to manufacture and sell Fisk detachable tires in Canada.

The Matheson Motor-Car Co. has purchased a site for its Detroit plant at Grand boulevard and St. Aubin avenue, measuring 224,000 square feet.

Mr. and Mrs. F. E. Sweeney, of Nashville, Tenn., have undertaken an automobile trip to St. Louis, Louisville, via Indianapolis and Springfield.

The American sales agency for Mercedes cars has been acquired from Mr. Charley, of Paris, by Allen, Halle & Co., of 89 Beaver street, New York City.

H. G. Bartlett and Frank S. Lowry, of Athens, O., have started in Mr. Bartlett's automobile for Denver, traveling through Columbus, St. Louis and Kansas.

The New York City authorities have purchased a 16 horse power Knox touring car for the use of the President and Commissioner of Public Works of Richmond borough.

The Motor Storage & Manufacturing Co., Chillicothe, O., has acquired the plant of the Woodcock Foundry Co., at the same place, for the manufacture of the Logan automobile.

The Supervisors of Suffolk County, Long Island, are said to be planning to provide roads frequented by automobilists, with thank-you-ma'ams, with a view of putting an end to scorching.

The Auotmobile Club of Wayne County, Ind., is sending out a post-card with a photo printed on its back captioned, "First Impressions of Indiana.—The National Highway, Looking Toward St. Louis."

In the manoeuvres to be held at San Francisco in August next, the Signal Corps will make use, tentatively, of two automobiles at present being built specially for the purpose by the Winton Motor Carriage Co.

Asbury Park, N. J., is rapidly gaining in favor with automobilists, and a summer resident states that he counted 350 motor vehicles which passed his house from half-past two until five o'clock one afternoon recently.

Harry A. Knox, vice-president of the Knox Automobile Company, Springfield, Mass., and Miss Mildred Fuller, of Chicopee Falls, Mass., were married last week at the home of the bride. They will reside in Springfield.

A Buffalo judge has declared his intention of fining automobilists $25 for the sec-

and arrest for speeding, with the prospect of imprisonment in the workhouse, with the option of a heavy fine, if the violation of the law continues.

Horace B. Day, New York City agent for the Queen cars, has decided to substitute electric wagons (three) for horse vehicles in the delivery system of the hotel supply business which he conducts at 125 West Thirty-second street.

The Providence Steel Casting Co., Providence, R. I., announces that by its process of making steel it is able to furnish castings of any degree of hardness, with a tensile strength of from 65,000 to 80,000 pounds per square inch, running from 10 to 40 per cent. carbon.

A horse that had become frightened at an automobile driven by Dr. Bransford Lewis, of St. Louis, who was accompanied by Dr. E. Fitzwater Woods, of Sedalia, Mo., jumped into the automobile, causing severe injuries to the operator and partially wrecking the vehicle.

The automobile repair shop of the De Conde Manufacturing Co., Cambridge, Mass., was recently damaged by fire, and three automobiles, which were in the place for repairs, were practically destroyed. The explosion of gasoline is supposed to have caused the fire.

In the automobile parade at Allenhurst, N. J., on the Fourth, 22 participants competed for the prizes offered by the Allenhurst Club for the best-appearing automobile. F. W. Woolworth and C. O. Burns, both of New York City, won first and second prizes, respectively.

On account of the delay in filing applications for registration numbers, required by the new State law, the Rochester, N. Y., authorities have granted immunity from arrest for failure to comply with this requirement until it was assured that the Secretary of State could supply all the demands for numbers.

An automobile ordinance has been introduced in the Kansas City, Mo., Council, providing for speed limits of 6 miles an hour in the most congested sections, 10 miles on less crowded streets, and 15 miles outside of the business and built-up localities. License numbers 4 inches high are required.

An automobile owned by Charles Battachon, of Rosebank, S. I., a member of the Staten Island Automobile Club, was wrecked recently in a collision with a train at Crook's Crossing, S. I., which is said to be unguarded by gates or a flagman. Mr. Battachon and his operator saved their lives by jumping.

As a result of a collision between an automobile and a train on the Aurora, Elgin and Chicago Railroad, last week, in which Mr. and Mrs. George E. Dixon, occupants of the automobile, were killed, the Chicago Council has ordered the elevation of the railroad tracks through the section in which the accident occurred.

Failure to appear for examination to qualify for permanent permits, after temporary permits had been granted, has been made the basis for instructions by Washington, D. C., officials, to arrest all negligent automobilists. The privilege of receiving temporary permits, pending the issuance of permanent ones, will probably be withdrawn, if it continues to be abused.

At the last weekly meeting of the New York Automobile Trade Association the secretary, William P. Kennedy, was instructed to prepare for the next meeting application blanks for the registration of station mechanics and chauffeurs. They will be charged 25 cents for registration, and the association will receive one dollar from employers for each man furnished.

The tax officials of Newark, N. J., hope to make up part of an expected deficiency in the income of the city by assessing automobiles. It is estimated that there are between 500 and 600 of these vehicles in Newark, and at an average value of $700, a revenue of $8,000 would be derived. The automobiles are registered with the Secretary of State, and auto owners would find it difficult to dodge the assessor.

E. J. Pennington, who is said to be a competitor for the flying machine or air ship prize offered by the St. Louis exposition authorities, was arrested at St. Louis on June 27 by Detective Cordell on a telegram from the sheriff at Pittsburg, saying that Pennington was wanted on a warrant charging conspiracy and fraud. The Pittsburg complainant must have thought it advisable to lay hands on Pennington before he should start with his flying experiments: "One bird in the hand," etc.

The preliminary arrangements have been completed for organizing the automobile owners on the island of Montreal, as the Automobile Club of Canada, and a committee composed of the following has been named to carry out the plans: William Yuile, Dr. Irvine, J. H. Dunn, Frank Meighen, J. R. L. Ross, S. A. Bent, G. Boisvert, Dr. Mignault, F. C. Wilson, A. J. Dawes, Duncan McDonald, F. H. Anson, J. Pasquin, G. Birks, F. Redpath, George Simard, A. Berthiaume and A. J. de B. Corriveau.

Desmarais & Co., of Bristol, Conn., are endeavoring to recover from H. P. Nielson, of St. Joseph, Mo., $160 sent him on account on an order for a number of sliding transmission gears which were never delivered. The gears asked for were those used in a runabout car constructed by an assembling firm, and Nielson, it is alleged, sent complainants blue prints purported to be of the gear in question, and claimed that he held patents on the gear and was the manufacturer thereof. He promised that he would finish the gears at once and deliver them at an early date, which he failed to do. Complainants state that they have since found that Nielson is not the manufacurer of the gears, but a local dentist and small dealer, and have placed the matter in the hands of a lawyer.

LEGISLATIVE AND LEGAL.

An ordinance has been presented to the Chicago council, compelling the placing of drip pans under automobiles to prevent oil and grease from dropping to the street. A penalty of $50 for violation is provided.

Authority to advertise for bids for the sale of the assets of the Chicago Motor Vehicle Co., an alleged bankrupt, has been sought in a petition to the United States Circuit Court by E. A. Potter, receiver.

Chauncey G. Parer, of Newark, N. J., has been appointed receiver for the American Compound Bearing Co. on the application of Albert A. Pope and other stockholders, who charged two of the officers with conspiring to sell stock of the company which had become worthless.

A company has recently been organized at Rendsburg, Prussia, for the purpose of distilling alcohol from peat. The company claims to be able to distill alcohol cheaper from peat than it can be obtained from other substances, and will, therefore, be able to sell its produce for fuel purposes.

Judge Newburger, of General Sessions, New York, has reversed the action of Magistrate Crane in fining Dr. J. Ralph Jacoby $25 for alleged speeding in Central Park. The evidence against the prisoner, which consisted of a policeman's uncorroborated testimony, was held to be insufficient

The ordinance committee of the Saginaw, Mich., council granted a hearing to automobilists on the proposed measure to limit speed to six miles an hour and to acquire registration numbers 6 inches high. A large number of automobile owners were present and they were unanimous in condemning the speed limitation as a farce and the numbers as unsightly.

A special act of the Maine Legislature has conferred upon the town of Eden, Me., the right to exclude automobiles from certain roads, and as a result Bar Harbor, within the corporate limits of Eden, is practically closed to these vehicles. The Eden officials led the legislators to believe that the roads in question were extremely dangerous for the use of automobiles.

Suit was recently instituted against Pickford & Co., in London, for operating a steam wagon with only one brake, contrary to the requirements of the law. Evidence was given of the mechanical construction and of the fact that the steam engine could be used as a very powerful brake, and Judge Lane held that the steam engine on the motor wagon, including the valve arrangements and the reverse gear, constituted a very satisfactory brake for the car, and the summons was dismissed.

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The St. Louis Tour.

Judging from the first list of entries for the St. Louis tour, just published, this event will fall far short of the early expectations of the organizers. Whereas the probable number of cars in the tour has been estimated at as high a figure as 2,500 and again at 1,500 and 1,000, the published list contains only a modest 34 entries, and only a fraction of these will go all the way to St. Louis. It will also be noticed that most of the entrants are manufacturers or manufacturers' representatives, the few private automobilists in the list being chairmen of local committees. From present appearances, therefore, the management has not succeeded to any extent in interesting the general automobile public in the tour. Undoubtedly the impression prevails that, since the tour takes the place of an endurance contest this year, it will be primarily a competition between manufacturers, and will be conducted on a strenuous plan; that there will be scrambles for the honor of first arrival in control stations, and that the tour will proceed without regard to weather conditions. Stop-overs in case of bad weather seem to be impossible, for the reason that all the divisions are scheduled to arrive at St. Louis the same day and participate there in a parade and other events; and unless later entries show a greater proportion of private owners, it may be expected that the run will be characterized by the keenest spirit of rivalry.

As regards the number of entries, it is, of course, still a fortnight before the start of the tour from the Eastern cities, and as the entry books will be kept open until the start, many additional entries will undoubtedly be received. In fact, the organizing committee states that 86 owners have given notice that their entries are forthcoming and 250 more have promised entry. The greatest contingent of the tour as it finally enters the World's Fair city will undoubtedly be from nearby States, Illinois, Indiana and Ohio, and it is to be expected that many who accompany the tour from these States will do so without formal entry.

On Automobile Lamps.

The provision of an automobile with a suitable lamp equipment is a matter which deserves due attention and judgment. Vehicle lamps are employed for two entirely distinct purposes, namely: first, to warn other traffic of the machine's approach and to prevent drivers of other vehicles from colliding with the rear of the car; and, second, to light the road for some distance in advance in order that the machine may be intelligently guided.

Municipal ordinances and State laws, as a rule, call for a lamp equipment capable of subserving the first named purpose, and leave to the individual owner such provision for illuminating the road as he may desire to make.

For warning lamps the kerosene type is perfectly sufficient and more convenient, reliable and economical in first cost and maintenance than is the acetylene variety. These lamps are equally attractive in appearance as well. For the illumination of the road, however, oil lamps are very inferior and of little practical value when high speeds are attempted. In this field the gas lamp, of good size, equipped with a parabolic reflector, is supreme, and the satisfaction arising from its use more than counterbalances its occasional unreliability, its considerable first cost and enhanced expense of maintenance.

An acetylene searchlight, particularly one which may be turned in any direction at will, is an almost indispensable necessity in night driving. It is common practice to mount these large and expensive gas projectors on the extreme front of the bonnet,

and it is not strange that a great many of them are damaged or entirely destroyed in service, as they are the first portion of the machine to strike an obstruction or to be struck by a backing vehicle. A collision, no matter how trivial, such as not infrequently happens on the road or through mishandling in the garage, while it would not injure the machine at all, often results in the complete destruction of the searchlight, which is located in such a position as to bear the full brunt of the shock. If the projector were mounted upon irons affixed to the dash, instead of being placed in front of the bonnet, it would escape damage due to slight accidents, and would be in a position to be regulated without requiring the operator to leave the seat.

The practice of placing the generator of the searchlight within the false bonnet, which is often nearly air tight, seems not as advisable, as its location on the side of the car, where it can readily be reached for purposes of regulation. The accumulation of gas within the confined bonnet space, in case of a leak or overflow, is not desirable from considerations of safety.

Lamps of all kinds require frequent inspection, to see that no part is in danger of being lost through the constant vibration to which they are subjected. Oil reservoirs and carbide containers are prone to becoming loose upon the road.

In city driving the employment of the searchlight or indeed of any more lamps than the law requires, is not only useless, but annoying to other traffic, and the use of an excessive number of lamps of high light the road, is an offence to drivers of unlighted vehicles on country roads. It is not uncommon to see a machine blazing with as many as six lamps of oil and acetylene, and this can hardly be regarded as other than an exhibition of that shallow ostentation which has done so much in the past to needlessly nettle and render hostile the power—more than is needed to sufficiently public at large.

Photos for Cars for Half-Tone Work.

Many of the photos of cars and chassis reproduced in our reading columns are furnished us by the manufacturers, and while in the majority of cases they are very sharp and clear, and excellently adapted for making half tones from, not frequently the reverse is the case. Photographers usually do the work as they are directed, and as frequently the person ordering the photos has little experience in this class of work, a few suggestions along this line may not be amiss.

In showing views of a chassis, the object generally is to convey an idea of the relative location of the different parts of the mechanism on the frame, and this end is always best accomplished by taking views straight from the top, side, front or rear. Views taken at an angle are much less satisfactory, not only because of the distortion due to the difference in the distance from the lense to the nearer and farther parts of the car, respectively, but also because many of the parts are generally hidden from view. A plain view of the chassis from above is the most important, and is best taken by raising the machine straight up in the air, standing it on the rear spring horns. If the car is a light one, it can readily be raised against a wall by several men, but, if heavy, a block and tackle may advantageously be employed. Care should be taken that the background presents considerable contrast to the color of the chassis, and a light colored wall is most suitable, while, if the machine is hoisted inside a building, a white sheet is preferably suspended back of it. A long focus lense should be used, in order to avoid distortion of the picture.

In regard to complete cars, it is impossible to lay down any general rules, as what is best depends largely upon the individual design and upon whether it is intended to use a single cut or several. Something may be said, however, with regard to back grounds. We have seen photos of cars taken in an open doorway, giving a perfectly black background, and the rear portions of the car being entirely lost, owing to want of light, while the front was very distinct. This is probably the worst possible way of photographing a car. It makes, of course, some difference whether the background is to remain in the cut or whether it is to be taken out. Some people prefer a cut with background taken out and photo retouched, giving the effect of a carriage fashion plate. In general, however, if the photographic work is well done—that is, if the outlines and details of the car are distinct and the background is pleasing to the eye—a cut made directly from the photo, with the natural background, carries the most weight, as it gives the reader the assurance that he sees a likeness of the real article, instead of an artist's idea of what it might be. The "fashion plate" illustrations still used by quite a number of manufacturers remind one strongly of the earlier years of the automobile industry, when it was often desirable to use an illustration of a car that had not yet materialized. Some rather freaky creations were evolved in those days by washdrawing artists, mostly from carriage makers' catalogues and the descriptions of automobile inventors. We remember one French contemporary reproducing a half-tone cut of a line of electric vehicles, the alleged product of a Western firm, cautioning its readers "that no one mistake this for a funeral procession."

It also does not seem to be known generally that a very satisfactory photo cannot be obtained from a car just out of the varnish department, owing to the varnished surface acting as a mirror and reflecting the landscape, which is reproduced in the photo. It is usual to photograph a car before any varnish is applied.

Accidents on the Taunus Course.

The fact that the Gordon Bennett race proper this year was singularly free from serious accidents has been pointed to as proof that road racing can be made perfectly safe if properly conducted. But it seems to have been lost sight of that while there were no accidents in the race itself, there were many serious and even fatal smashups on the course during the several days immediately preceding the date of the race, which can be directly traced to the development of the racing spirit. Three persons are positively known to have been killed in these accidents, viz.: Baron von Leitenberger and his chauffeur and Herr Eckstein. Leitenberger and Eckstein were both driving in what may properly be described as racing cars—machines of 60 horsepower. Many accidents also occurred in which only the cars sustained damages. Says our English contemporary, the *Automotor Journal*: "Valuable touring cars that had come to more or less grief were encountered, on an average of about one in every five miles of the course. Some had nothing worse than their bonnets stove in through being made to charge banks, telegraph poles or pine trees in the endeavor to avoid collision with approaching vehicles. Others sustained broken wheels and similar fractures, being overturned by the roadside." Mishaps of this sort were too numerous for separate mention.

Contact Breakers and Timing Devices.

By Julian C. Chase.

With the solution of the general problems connected with the design of gasoline engines well in hand, the attention of designers and builders is now directed to a closer study of details. The special importance of each individual part is being more and more appreciated by the student of the subject, with the result that many minor changes are constanly being made in the construction of these engines which entirely escape the notice of the casual observer.

Defects in the electrical devices connected with gasoline engines have, as has often been said, been the cause of the greater part of the annoyance and both to which the user has been subjected, and these defects have frequently been located in the devices for closing and opening the ignition circuits. The contact breaker is the keystone of the gasoline engine. It must satisfy both electrical and mechanical requirements, and its perfection must therefore be measured by two standards.

TWO GENERAL CLASSES.

The devices serving the purpose of circuit breakers naturally divide into two classes, because of the two distinct systems of electrical ignition employed, namely, the jump spark and the make-and-break, or the high and low tension systems. In the second of these, the circuit is broken by moving parts inside the explosion chamber, whereas in the first the rupture takes place outside. Because of this fact, the detail construction of one is necessarily entirely different from that of the other. There are two entirely different sets of conditions to be contended with in the two cases.

The office of a contact breaker of the first class is to close and open a primary circuit containing a source of electric current, thereby inducing a current in a secondary circuit of so great a potential that it will jump across a gap between two points inside the explosion chamber. The office of a circuit breaker of the second class is to produce directly, as it were, the igniting spark by a sudden separation of two of its parts, thereby causing a quick break of the electrical current which passes through it when these parts are in contact.

It is proposed to discuss herein a few devices of the first class which have recently been brought out and to which the word "improved" may be applied, and for purposes of comparison to take up one or two which have hitherto been employed on the leading cars.

In the jump spark, or high tension system, a spark is caused in the secondary only when the primary circuit is quickly broken. For this reason it is necessary to have somewhere in this circuit a means of producing either one or a series of these quick breaks for each explosion desired in the cylinder. The statement of this fact brings us to another dividing line between two types included in the first of the two different classes of contact breakers mentioned above. The first of these gives a short contact and quick break of the primary circuit, and the other a long contact, allowing the current to flow for an appreciable period, the current itself operating a vibrator on the induction coil, which automatically closes and breaks the circuit at that point with great rapidity, so long as it is closed at the other.

With the perfection of the vibrator on induction coils, the use of the second of these types is becoming more common, and we will therefore treat it more thoroughly.

There are several salient features which a contact breaker of the first class should possess. Opinions may differ as to their relative values, and we will not, therefore, attempt to set them down in the order of their respective importance. They are:

1. Positiveness in action, securing (a) accurate timing of the spark, (b) good electrical contact, (c) clean break of the circuit.
2. Absence of influence of wear on adjustment.
3. Careful insulation.
4. Freedom from noise in operation.

POSITIVENESS IN ACTION.

To secure this feature the device must be well made mechanically. It is of primary importance that the stationary and revolving members should at all times bear a fixed relationship to each other, as regards the planes in which they are located. There must be no possibility of a disturbance of this relationship by the action of cams or other moving parts upon parts which remain stationary. To illustrate this point, it may be said that in certain styles of contact breakers hitherto employed, the bearing supporting the base which carries the fingers or pieces for distributing the current to the various coils is too short, with the result that under the action of the cams against these fingers this base is thrown slightly out of its proper plane, and the movement which should take place between the contact points is reduced by the amount of this displacement.

There has been a tendency to make these devices too delicate, and to depend too much upon nice adjustment for their successful operation. In general, the maximum movement between the points has been far too small, amounting in some cases to no more than the thickness of a piece of paper. As a result, the proper adjustment is not only hard to secure in the first place, but after it is once obtained it is hard to maintain, owing to the liability of the locking mechanism to work loose, and also on account of the burning away of the points by the spark generated by the rupture of the circuit. This lack of movement has the further disadvantage that small quantities of oil or water or small particles of greasy grit will bridge over the gap between the points when they are separated mechanically.

It is obvious that great care is necessary in the general mechanical construction, in order to insure the proper timing of the spark. The contact must be made and broken at a fixed point, with regard to the position of the piston in the cylinder, and if a number of cylinders are used, the spark must occur in each at the same relative time. The contact points must be so placed that for a given position of the spark advance mechanism the spark will occur at the same point of the cycle in each cylinder. The power and smoothness of running of a multiple cylinder engine depend to a considerable extent upon the accuracy of construction in this point.

TOUCH AND WIPE CONTACT.

The need of a good contact between two surfaces for the conduction of electricity from the one to the other is appreciated by the electrician more than by any one else, and it is due him to state that the touch contact, formerly much employed in timing devices on gasoline engines, has long ago been placed under the ban, except for places in which it is impossible to use another type. By the touch contact is meant one in which the two contact surfaces are brought together by a motion in a direction perpendicular to their planes. If both surfaces so brought together are clean, the electrical contact depends to a certain limit upon the pressure between them. In the separation of these points a spark is generated which burns the surfaces and covers them with a scale which is a poor conductor of electricity. As the action of the surfaces in forming and breaking the contact in no way tends to remove this scale, it gradually accumulates and eventually must be removed by hand. The same may be said in regard to particles of foreign matter which may accumulate on these surfaces in operation. By designing the moving parts so that in establishing a contact one surface is drawn across the other, a cleaning action is obtained each time contact is made, and the probability of failure to conduct the current from one to the other point is greatly reduced.

While it is of great importance that the contact should be made positively, it is also important that it be broken positively, and for this reason the amount of movement between the contact points should be as great as possible, within practical limits. A good contact breaker will not allow a drop of water or oil to bridge the gap between the separated contact points.

WEAR MUST NOT AFFECT ADJUSTMENT.

The importance of this point is apparent. From the nature of things, the parts of a contact breaker must be small, and the wearing surfaces therefore cannot be made as large as might be desirable from some points of view. Wear will take place both because of mechanical movement and because of the electrical burning of the contact points. The point is then to so design the device that this wear will not tend to disturb the proper timing of the spark in the cylinders. If only one cylinder is used, the effect of such wear can usually be corrected by movement of the spark advance

mechanism, but when more than one cylinder is employed and the wear is uneven on the various distributing parts, its effect can only be corrected by a readjustment of the whole device.

CAREFUL INSULATION.

The low potential of the current in the primary circuit of the jump spark ignition system makes it a comparatively easy matter to prevent its straying from its proper course. In fact, the interposition of a piece of dry writing paper is sufficient to prevent the flow of the current. There are, however, other factors to deal with besides the potential of the current in constructing a device which will be perfect in regard to the insulation of its various members.

So long as it is a common practice to place the device in a position where it is apt to be soaked with oil from other parts, it is necessary to provide against any likelihood of short circuits developing from the accumulation of this oil. The possible presence of moisture must also be taken into account. The first requisite is space-distance between the parts to be insulated. It very often happens that two parts which must be insulated from each other are so placed that a drop of oil or water can touch both at the same time, with the result that a short circuit is formed. By increasing the distance between these points the danger of short circuiting is diminished.

The possible presence of oil makes necessary the employment of insulating materials which are not affected by it in any way. Rubber and mica are, therefore, not so desirable as fibre.

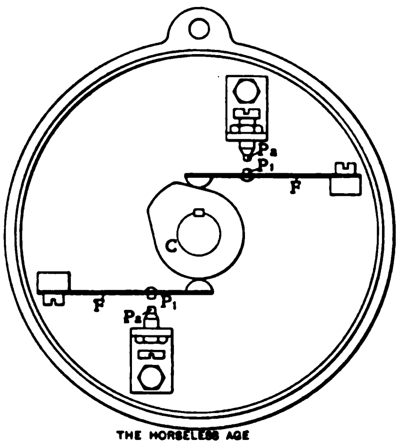
FREEDOM FROM NOISE.

It is true that the noise of contact breakers has not hitherto been considered a feature of any great importance, but in this day, when efforts are made to reduce the noise of the car as a whole in all possible ways, the freedom from noise may be a factor for consideration in comparing contact devices of equal merit in respect to other qualities.

Having thus pointed out the requisite characteristics of a successful contact breaker for the jump spark system of ignition, we will consider from a critical point of view a few of those which are now in use.

Fig. 1 shows a style which has been used a great deal. The cam C is attached to the "two to one" shaft of the engine, and as it revolves, raises the spring F so that the point P_1 comes into contact with point P_2. The current then passes through this contact and through the complete primary circuit, including the source of electrical energy and the primary windings of the induction coil.

In this device we have the touch contact, which is bad electrically. Again, the distance between the contact points when the contact is broken is less than the total lift of the cam, as one contact point must be



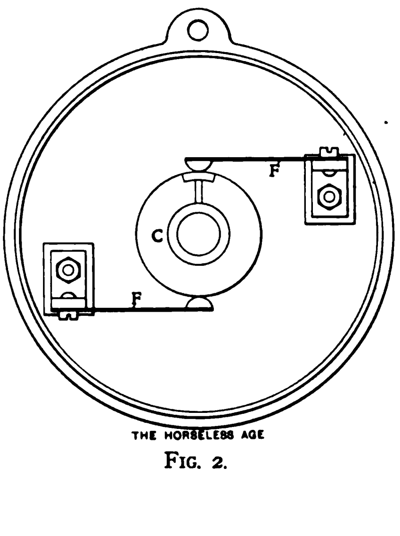
THE HORSELESS AGE

FIG. 1.

located at a short distance from the end of the spring, in order to secure a cushioning action when the contact is made. Many cases have been noted in practice in which the maximum amount of this opening did not exceed 1/16 of an inch. It is impossible with this construction to get sufficient distance between the piece which carries the point 2 and the grounded part to eliminate the danger of a short circuit by oil or water.

When the device is applied to a multiple cylinder engine, and a number of springs are employed, any unevenness of wear on the part of these springs, which rest upon the cam, may tend to make one cylinder ignite sooner or later, relatively, than another, and thereby disturb the perfect timing of the explosion. All contact points must be so adjusted that the maximum opening or break is the same at each pair of contact points. If the distance is less between one set, contact will be made sooner, and the spark occur earlier in its cylinder than in the others.

In the device shown in Fig. 2 the ideal seems to be attained in many particulars. In this case the revolving member C, which is attached to the "two to one" shaft, consists of a disk of insulating material. A metal piece which forms part of its periphery is connected electrically to the shaft to which the disk is secured. As this piece comes into contact with the piece F, the cur-



THE HORSELESS AGE

FIG. 2.

rent passes through the connection so made and through the primary circuit. Here we have a wipe or self-cleaning contact, which is the best electrically. There is also only slight likelihood of continued contact between the contact surfaces, as ample clearance is provided. The weaknesses in the device are that there is a possibility of uneven wear on the springs if more than one are used, and the fact that it is not so compact as some other types can be made. It is also true that the friction between the spring and the moving member, when sufficient tension is given to the spring to assure a good contact at all times in spite of the jar and vibration to which the device may be subjected, tends to increase the wear on the contact surfaces. It is, of course, necessary to insulate the different springs from each other, and there is danger of getting too near to each other parts which should be well separated electrically.

Certain modifications of this type are possible, especially in regard to distributing fingers, which may be constructed so that they act radially upon the periphery of the moving member, but this necessitates an increase in the number of small parts, and the chances of short circuits and other troubles are multiplied.

An interesting device recently brought out is illustrated in Fig. 3. The revolving member C comprises a sliding part which is pressed outwardly by a spring against the inner face of the ring carrying the contact pieces, which are connected by wires to the various coils. These pieces are so made that the pressure of the moving part on the stationary contact is increased as it moves over the surface of the latter, and because of the abrupt ending and the consequent sudden releasing of this pressure, a very quick rupture of the contact takes place.

This construction provides a wide contact and permits of ample room between the active parts, to insure good insulation. It has a possible advantage over the other types shown, in that it produces a very abrupt break of the circuit, and with certain types of coils will cause a spark to jump in the secondary circuit even if the vibrator refuses to act. It would seem that even though hardened steel contact pieces are used, there must be considerable wear upon them, and there surely must be upon the insulating material in the ring and on the slide in the moving member. It would also seem that the noise from the operation of this device at speed would be a possible objection to it. It is, however, undoubtedly an advance over the other types shown.

The criticism which has been made of this device does not apply to the one shown in Fig. 4, although the two are very similar in general design. The chief difference lies in the fact that in this case a roller takes the place of the sliding member, and the contact pieces on the ring are flush with the inside surface. The contact of the roller on these pieces is not exactly of the wipe

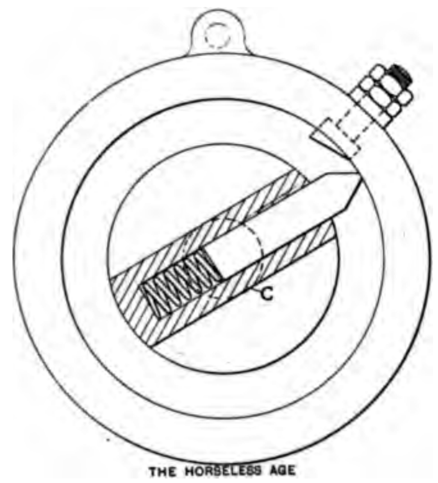


Fig. 3.

type, but because of the rolling friction a greater pressure can be obtained between the two surfaces with less wear, without increase in the amount of power consumed in operation. Ample clearance is provided between parts insulated from each other, and there is no danger of a continued circuit between the contact surfaces. There are absolutely no parts to get out of adjustment, and provided it is once made right, a uniform timing of the spark in all cylinders will be maintained. It should be absolutely silent in operation.

SECONDARY COMMUTATORS.

Up to this point we have been dealing with systems in which the primary circuit is alone interrupted, and which require a separate coil for each cylinder of the engine. Attempts have been made in this country to commutate the secondary, but these have been only partially successful. A glance at the work of an English designer in this line should, therefore, prove interesting. In this system only one induction coil is used for the whole engine. A single pair of contact points are employed in the primary circuit, which are brought together by the action of a cam with as many projections as there are cylinders in the engine—at the proper time for the ignition of each charge.

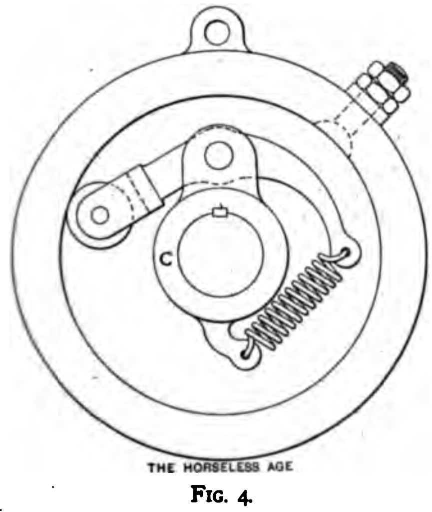


Fig. 4.

Geared to this cam is the distributing device for the secondary current, so designed that when a contact is made in the primary circuit the induced secondary current is conducted to the proper cylinder.

The advantages of this system over the more common method of employing separate coils for each cylinder are two-fold. As there is only one set of wearing parts, whatever wear occurs will affect the timing of all cylinders equally, and consequently a perfect relationship is maintained at all times. Again, the character of the spark in all the cylinders must be identical, as there is no chance for varying adjustments of vibrators.

St. Louis Tour Notes.

The various sections will be in charge of the various chairmen of local committees. Thus Mr. Glidden will captain the New England Division; Mr. Smith will be in charge across New York State; Mr. Waite, from Buffalo to South Bend; Mr. Mudd, for the balance of the main line. On the National Highway, Messrs. Scott, Monypeny, Varney, and others will be in charge. At St. Louis the local committee and the Automobile Club will take charge.

Mr. Post and Mr. Gillette will travel with the main line division, and will exercise general control over the tour on the road. A. B. Tucker has been appointed advance agent of the Touring Committee. He will travel by railroad, arriving at each night's stop in advance of the tour, and will have authority at all points to complete hotel and garage arrangements.

Each car in the tour will carry two official numbers, 12 by 18 inches in size. No penants or other decorations will be furnished, but no restrictions have been placed on the tourists if they desire to decorate their cars at St. Louis or any other point.

Entrants will receive their road cards, with running directions, together with suitable cases for their protection, on or about July 20. Entry numbers will be sent on this date or earlier. Each entrant will also receive detailed instructions regarding all stops, luncheon places and all arrangements for the tour shortly before the start.

The names of entrants, as received, will be filed at the headquarters of the committee, and may be obtained from day to day. The list will be sent out with each of the bulletins issued. A complete list, with details of cars, etc., will be sent out just previous to the run, but entries will be received up to the hour of the departure from each city.

W. A. Copeland, committeeman at Pontiac, writes to Chairman Mudd that the council is taking the matter up, and will provide entertainment for the tourists, making the afternoon and evening of the day of their arrival a gala occasion. The Vermillion Club of that city will throw open its club baths to the St. Louis tourists, a comfort which will be much appreciated.

Col. R. D. Loose, at Springfield, Ill., writes as follows:

"The roads around this city have not been fixed up as yet, owing to the farmers being late with their crops, but from now on they will get to work, and by the time of the run they will be in good shape. Had they been fixed before this they would have been all cut up by this time on account of the many rains we have had this spring, but in July and August we do not have many rains, and what we do have quickly dries up, so do not think the tourist will have any complaint on account of the roads being rough."

Chairman E. P. Moriarity, of Kansas City, writes as follows:

"I have received a number of letters from various towns in Kansas in regard to the best route across that State for the Denver tourist, and the following suggests itself to me: Enter the State west of Goodland, on the C. R. I. & P. R. R.; follow that railroad to Colby, Kan.; then follow the Colorado branch of the U. P., passing through Hill City, Silven Grove and Lincoln. Here the Salina Valley is entered, which follow to Salina; thence to Manhattan, Wamego, St. Mary's to Topeka, via Lawrence to Kansas City. My report states that this road as far as Hill City is as smooth as a floor, except a few miles between Hoxie and Morland. It is my opinion that 80 to 100 miles a day can be made over this route easily, providing the weather is good, which is probable at that season of the year."

A list of thirty-four entries, all that were received up to July 8, accompanied this "Bulletin."

The Toledo Club has rented a suite of rooms at the Boody House, adjoining the rooms allotted to the Association as headquarters. In addition, the Toledo Club will send a committee some fifteen or twenty miles east from that point to meet the incoming automobilists and do whatever they can to direct and aid them in the completion of that day's trip. They are also going to mark the route through the city with flags. At the Boody house headquarters, a special committee will be on hand to act as a general information bureau. Members of this committee will wear red caps, which will make them easily distinguishable to all tourists. This detail is one which is suggested to the local committees in all towns through which the tour runs.

Alexander Fischer, a well-known New York automobile importer, ended his life on Wednesday night last by shooting himself. Ill health is supposed to have prompted the deed. Mr. Fischer some years ago was superintendent of the Automobile Co. of America, and was the designer of the "gasmobile" which it built. When the company failed he took the American agency for the French Rocket-Schneider car and later the agency for the Swiss Martini car.

TOURING ROUTES

From the Hub to the Canadian Border.

BY N. A. T.

(*Concluded.*)

Surrounded by the mountains, the scenery became grander as we alternately rose high above the river, or skirted its banks, and the valley, winding in and out, afforded many charming views. Ascending a sharp grade we entered the village of Sharon. The little valley from which we had risen seemed entirely walled in, and the placid river looked like a silver thread winding across the carpet of green. As we gazed, the sun, till now darkened, broke through a rift in the clouds, casting a path of gold down the river and gilding the mountain tops. We did not expect to find so rare a bit of scenery in our eastern mountains.

Over good gravel road we made excellent time to South Royalton. However, let it be understood, the object of our trip was pleasure—not to make a record; so we lay little stress on speed save to let one who has limited time know that much of the way from twelve to fifteen miles an hour can be easily made.

Between Sharon and South Royalton the narrow road is wooded to the edge, and in some places the branches meet overhead. Here in this dell we came upon a team, a woman and her daughter driving home. We halted and she did. In response to our inquiry if her horse would be afraid, she replied: "I don't know; he's never seen one before; but he'll tear awfully if he takes a notion to tear." With this prospect in view we decided that discretion was the better part and ran into a meadow, which, fortunately, was only a few yards back, giving the horse the road. We found that the majority of the farmers were anxious to have their horses get used to an auto and seemed to realize that henceforth the road was to be shared alike by the horseless and the horse-drawn vehicle.

From South Royalton to Royalton was a short and delightful run of only two miles, and right merrily we bowled into the village—which we heard had the best hotel thereabouts—and stopped at the Cascadnac House at just 7.15 p. m. In spite of crossing the mountains, we had made nearly ninety miles that day, and felt no fatigue. We were glad that we had taken the route advised and seen the wild country, but if one has a car which does not climb hills—long, steep grades, I mean—without trouble, the sand road by the river may be easier. As we entered our hotel it was with a feeling of satisfaction in the day's experience; resolved that our car was "worth its weight in gold," and that no pleasure can compare with automobiling.

AN IDEAL FARM HOUSE AT HOOKSET, N. H.

To our good host's fine supper we did ample justice, and soon parted, leaving an early call, that we might be away in good season next morning.

But Fate and a flaw in a casting willed otherwise. After living for two whole days in the realm of the ideal it was necessary, we suppose, that something should bring us back to realities, and the mishap and delay which one looks upon as a necessary part of an automobile trip, was just ahead of us. Everything was packed in, we had photographed the car as it stood in front of the hotel and had said "Good-bye." We went a few feet then—Snap! our steering rod had broken.

Of course we were provoked, but nothing remained for us but to spend the day where we were and send for a new part. So we set about to enjoy the day as best we could. The men polished the brass on the car, while the girls took a stroll down the river road toward South Royalton. After lunch we all went to see a collection of South Sea Island curios, shells and corals owned by the preacher there, a returned missionary. We met nearly all the townspeople as they came up to offer sympathy—and see the machine. One old settler of eighty-five years told us the winters were not so cold as they used to be, for, when he was a boy they drew two-horse loads of snow from the mountains to cool their whiskey on the Fourth of July. With the camera and a carriage drive, the late afternoon was pleasantly spent and in the evening we "shopped" at the country store.

Though vexed at not being able to proceed, we agreed that Royalton was an ideal place to stop. The rates are $2.00 per day and our auto was kept in the stable without charge. The house has been newly remodelled and was bright and airy, and the meals were excellent. This house, too, is historic, being situated on the old King's Highway to Montreal, and in the room where the writer slept Lafayette had once been entertained.

A small boy rode by us on his tiny bicycle as we stood by our "crippled" auto. We asked him how he would like to swap machines. This was his apt reply: "No, I don't want to; your's ain't so good as mine anyway, 'cause yours gets out of tinker." The look and tone of disgust were decidedly amusing.

At 8.15 the next morning, our "broken arm" set, we started on our forty mile spin to Montpelier. The road is very much the same as below Royalton, hard and smooth, following the curves of the river, now close to its waters, again on some knoll commanding an excellent view of the Winooski valley.

Our first experience this morning was with an elderly couple driving an aged horse. As soon as we came in view the old lady began to fidget. Her husband tried to make her keep still, but, poor soul, she was so terrified that when he called to us to run by, she cried: "Oh, don't, don't, don't, don't! I'm afraid on 'em anyway." Much provoked and wholly confident the old man whipped the horse past us, the old lady meanwhile remonstrating and trembling with fear.

In East Bethel village a frightened horse dodged round a telegraph pole, taking the wagon between it and a stone wall, happily without disaster.

The dirt road became harder and better

as we spun along, our delight only exceeded by our surprise to find it thus. It was amusing to watch horses in pastures near the road. As soon as we were seen they would run to a safe distance, turn about and look. Often we glanced back to find them turning their heads, and even their bodies, in order to watch the "monster" out of sight. They knew not the pride which kept the faces of the equally curious farmers turned resolutely away till we had passed. Then they "rubbered." We met several yoke of oxen, now quite rare, but

Making the Best of It.

still used considerably through this district. None showed the slightest fear, so we might advise timid farmers' wives to substitute oxen for the horse during automobile season.

Unexpectedly we came to a stretch of perfect country road, equal to a boulevard, leading down grade, now with an abrupt turn, then straight ahead for a long way, till it ended in a most beautiful gorge. Shut in by mountains, at times the cut was scarcely wider than the willow-shaded road and then again wide enough for a tiny meadow between the mountain and the streams. For at least a mile we sped along this enchanted valley, with its tiny rivulet and green-clad walls, past the fine hotel at the farther end, then up to the heights again. What a "Fisherman's Paradise"—to be able to catch the speckled beauties with none of the unpleasant experiences of climbing over rocks and through thickets. Leaving this—the Gulf Road, we learn—we bowl merrily over the fine dirt road, past well-tilled farms to East Brookfield.

Near this village we had a rather amusing and at the same time most exasperating experience. We ran close up to a team and "tooted." The driver, a Hebrew peddler, turned, drew his horse to a stop, and facing us, shouted: "You can't go py! You vant to tep me ofer! You vant to speel my loadt! You haf no right dere!" Remonstrance was in vain, kind words had no effect, threats only called forth a volley of oaths, and when we attempted to run by, the irate Jew pulled his horse directly in front of us. Had it not been for the approach of two frightened horses we would have secured our half of the road, never fear; but the drivers begged us to desist, so we had to run behind the swearing old pedler till he reached a farm, where he wished to stop.

"Cleaning Up," Cascadnac House, Royalton, Vt.

Just as we entered Barre, which we at once knew by the granite quarries, we met the first party who did not dare to pass the car, but drove back and into a dooryard. Through this city we ran over the worst road yet encountered. Granite being so cheap, they use broken bits to fill in the mudholes in the streets. The result you may guess. However, we got only one cut, and that in the "shoe" only.

A little way out the road improves and from Dewey Park to Montpelier, about a six-mile run along the river bank, was quickly made, entering the city at 11 o'clock. Here we took on nine gallons of gasolene, filled our water tank and at 11.20 a. m. were speeding along East State street, the splendid boulevard by which we left the city. On and near this are the city's finest buildings, and we passed the Capitol. For about two miles we made very fast time and taking the right at the fork by the school house, we crossed the river and the "C. V." tracks and began to climb. The road was good but hilly, and we questioned whether or not the left bank would have been better. But here we were. However, the scenery was grand as we looked ahead, with Camel's Hump in the distance, a tiny village nestling at its feet; and between the broad valley and gleaming river.

In a small town we passed a four-horse team standing without a driver. The leaders were afraid and turned, breaking the pole; whereupon all four started and would have smashed things generally had they not been stopped by an embankment. This was the only runaway of our trip and not serious.

As we left the river and went up and up, we came to a little clearing with a farm or two, and a beautiful pond. With awe and admiration for the wonders of nature we beheld an island of solid rock, tree crowned, which rose for more than a hundred feet from the center of this tiny lake.

Returning by tortuous declines to the river level, we passed the Winooski Valley Fair Grounds, and in a few moments rolled into Waterbury, a town of considerable size. Here we passed in full view of the large, fine buildings and well-kept grounds of the State Hospital for the Insane. The hotel is good and we would have stopped for

dinner had we not been anxious to make up our lost day.

Some distance on, as we were running along a bluff, high above the valley, we suddenly rounded a curve and saw hundreds of feet beneath us the gorge of the Mad River. From this bluff we crept slowly down hills so steep we almost held our breath as we gazed into the chasm beneath and thought of what might happen.

Near the foot of these we met a Hebrew, pushing the heavily-loaded wagon his horse could scarcely draw. Taking our advice with alacrity, he doffed his coat and covering the horse's head guided him by in safety.

At last we came to a fine level stretch and, letting our machine go, we sped along by a school house, sending the youngsters in haste to a place of safety. But this was for only a short way, and through Bolton, Jonesville and Richmond it was indifferent roadway till, leaving Williston, we emerged through a long row of maples from the valley and rose to a slight elevation, from which we could see far ahead, the dim outlines of the Adirondacks. From this we dropped down a long smooth grade into Essex Junction, about thirty miles from Montpelier.

Entering the Gulf Road Between E. Randolph and E. Brookfield, Vt.

Here we snatched a "cold bite" at the railroad restaurant and at 2.47 p. m. were once more on our way, taking the hill road by Fairfax, nine miles distant, to avoid the sand by Milton. At the top of a long climb we found a culvert up, and had it not been for a wide roadside we would have had to turn back. Here is where we all walked but the driver. This safely passed over, our next difficulty was a four-horse road scraper. Again the wide, grassy roadside proved our deliverance.

From the top of a hill near Westford we got an especially fine bit of characteristic Vermont scenery. Fairfax lay at the foot of long sand hills which gave us some trouble from skidding. In the village itself is as good a hill for a test as one could find, but we had good steam on and sailed up to the top, which commanded a view of Lake Champlain (our first glimpse) without a slackening of speed.

An old fellow, driving lazily along, sang out to us, "Come ahead, he ain't afraid of ye," and truly an earthquake could not have roused his sleepy old animal.

For miles we went down all the way, passing the reservoirs for the City of St. Albans, now filled to the brim, but at one time last winter containing only four feet of water, along the edge of a deep gorge, cut by a mountain brook, till we reached the level of the plain. Droves of cattle hindered us; so we ran up close and started them along, much to the disgust of the farm lads.

Entering St. Albans, we passed some fine homes and ran along the main street to a station for gasolene. We took on five gallons and meantime held quite a reception, greeting many of our friends. Were it not that our old home lay only thirty miles north, we would have stopped at the "Park View," a very good $2.00 a day house, and spent the night. As it was, we did not stop, even to refresh the inner man, and at five minutes of six were well on our way to the line. At the first fork we were wrongly directed, and instead of following the good level river road through Highgate and Sheldon Junction we went over the roughest road and through the wildest country we had seen at all, into Sheldon, and finally reached the river again by North Sheldon. Why our machine was not racked to pieces we cannot tell, and we lay it to the power of the Supernatural that we escaped without mishap from that nine miles of wilderness.

Far up there among the hills lies Fairfield Pond, as lovely a sheet of water as any we have seen, and an ideal camping spot for one seeking perfect quiet.

In Sheldon village we passed the building where the historic St. Albans raid was stopped. At a covered bridge we stopped for water, then pushed on, as rapidly as common country road would allow, to Enosburg Falls, which pretty village we reached just at dusk.

While the lamps were being lighted we made a vain search for something for a lunch. With little delay we started on the

One Way of Passing a Horse.

:en miles of our trip; passed through uiet village of East Berkshire, and at p. m. rolled into the almost deserted street of Richford, and up the hill r goal, one mile from that imaginary hat separates our United States from 'ealm of King Edward the Seventh. l? Some. Hungry? Yes! But vot-ur trip an ideal one and this the time : year in which to enjoy it most. Since ıg Royalton, in the morning, we had above 125 miles, and so had more completed three centuries in the run Boston. During the run we had taken ½ gallons of gasolene and had ten in ınk at the start and about five at the ; so you see, our entire consumption ›nly 36½ gallons for the run. Then, of our stops were unnecessary, so the ıse could easily be lessened. Our car ıs 1,750 pounds, when empty, and three ases and small parts, oil and carbide have added considerable to the ıt, which, with five adults, was prob-nearly 2,500 pounds.

›ugh we stopped on the American side, what I know of the country I am an easy and pleasant run to Montreal be made in a day.

vould advise you to do so when you this delightful trip, which will always a pleasure to anticipate and a joy to ect.

. State Senate Committee Road Tour.

: tour of road inspection by a New State Senate committee in automo-was started from the Murray Hill , New York city, last Monday. Four ıad been placed at the disposal of the authorities for the purpose of fa-'izing them with the road conditions :w York, New Jersey, Connecticut and ıchusetts, with the view of insuring favorable results from the roads ap-iation of $1,500,000. Albert R. Shat-chairman of the Good Roads Com-: and former president of the Auto-e Club of America, George F. Cham-and Robert Lee Morrell, volunteered services as well as their cars for the Jefferson Seligman was also expected rve in a similar capacity, but he was nted from participating, and a fourth nd the services of an operator were ıhed by the White-Sewing Machine The State Committee includes Sena-Allds, Armstrong, Douglas, Stevens Bailey, State Engineer and Surveyor Van Alstyne and W. Pierpont White. nan of the Interstate Roads Commit-The following itinerary has been ed for the tour: Trenton, N. J., lay; Newburg, N. Y., Tuesday; Rye, Y., Wednesday; Hartford. Conn., ıday; Springfield, Mass., Friday; Bos-Saturday. It is not their purpose to ıe themselves to the best roads ghout the tour, but ordinary and roads will be sought for sake of con-

BEGINNER'S PAGE

Compression in Gasoline Engines.

One difference in the construction of gasoline and steam engines is that whereas in steam engines every effort is made to reduce the empty space back of the piston at the end of the stroke (called the clearance) to a minimum, this space in a gasoline engine is always of considerable volume. In a steam engine the working fluid is admitted to the cylinder only during the power stroke, while in a gasoline engine all of the working fluid is contained in the cylinder before the power stroke begins, occupying the clearance space, here called the compression space. In the earliest explosive engines the clearance space was filled with combustible mixture at atmospheric pressure, which was ignited at about the beginning of the power stroke, and then allowed to expand. It was found, however, that this method of power generation is very wasteful of fuel, and that with it only a small amount of power can be obtained from a comparatively large engine. To avoid these disadvantages the charge of combustible mixture is now always compressed in the clearance space or compression space, prior to being ignited, to a pressure of 4 to 8 atmospheres.

ADVANTAGES CF COMPRESSION.

Compression in gasoline engines offers the following advantages:

1. It gives a greater working pressure, thus increasing the power.
2. It results in a more complete exhaustion of the burnt gases after combustion, giving a purer charge for the next cycle.
3. It reduces the extent of cylinder wall surfaces and consequently reduces the radiation or waste of heat through the walls.
4. It increases the speed of combustion and therefore allows of higher engine speeds, which in turn leads to an increase of power.

All these advantages increase with the compression employed.

With ignition at atmospheric pressure, an initial explosion pressure of only 60 to 70 lbs. per square inch is obtained, but if the charge is previously compressed, the initial explosion pressure is greater in proportion to the pressure of compression. Thus, with a compression of four atmospheres an explosion pressure of 240 to 280 pounds is obtained. It is well known that the power of an engine of given dimensions depends upon the pressure of the working fluid, and consequently the higher the compression used in the engine the greater the power it will develop.

At the end of each exhaust stroke a certain amount of burnt or spent gases remains in the cylinder, filling the compression space, and diluting the new charge drawn in during the succeeding suction stroke. A diluted charge gives a smaller initial pressure and develops less power than a pure charge, and consequently it is desirable to reduce the diluent gas to a minimum. The amount of spent gases remaining in the cylinder depends directly upon the volume of the compression space, and is consequently smaller the higher the compression used and the smaller the compression space.

Another advantage of high compression is that less heat is lost through the cylinder walls. Without compression, the combustion chamber, to hold a certain amount of charge, must necessarily have a very much greater wall surface than with a compression of several atmospheres. As the radiation of heat depends almost directly upon the area of wall surface, it will be seen that there would be much more radiation, and consequently much greater loss of heat, in an engine operating without compression.

A further advantage of compression resides in the fact that a highly compressed charge of combustible mixture burns much quicker than a charge not compressed, and consequently allows of higher piston speed. As the piston speed is one of the factors determining the power of the engine, higher compression thus allows of increasing the motor power by operating at higher speeds.

LIMITATIONS OF COMPRESSION.

There are, of course, certain limitations to the compression which it is practicable to use in gasoline engines for automobiles, and 120 lbs. to the square inch is probably the highest compression pressure which has yet been used successfully in this type of engine.

The causes which limit the compression which may practically be employed in a gasoline motor for automobiles are as follows:

1. Danger of premature spontaneous ignition at high compression.
2. Increasing leakage past valves and piston.
3. Greater vibration of engine with increasing compression.
4. Increase in strain on working parts and wear on bearing surfaces.
5. Difficulty of starting by hand.

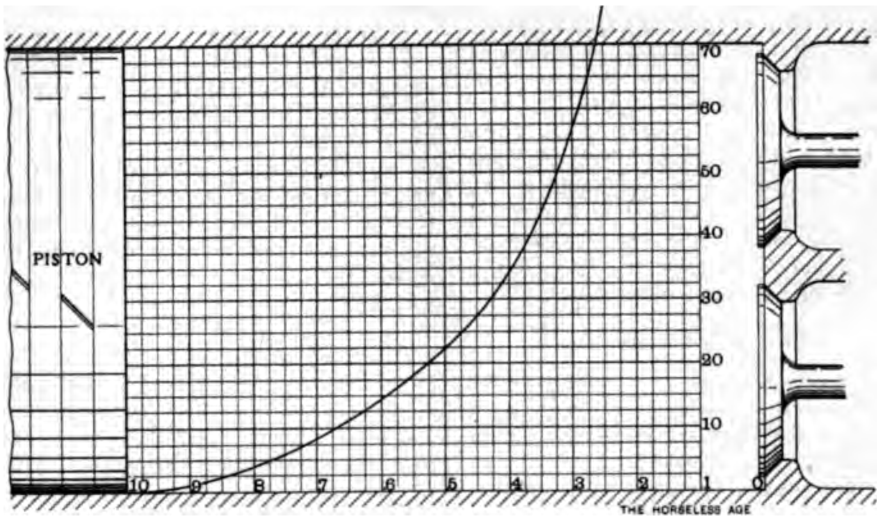
If the compression is carried too high, the charge has a tendency to ignite spontaneously at a too early period, much before the crank has reached the dead center, thereby subjecting the entire mechanism of the motor to enormous strains. This tendency for premature explosions to occur is especially pronounced if the cooling system is not very effective, or if there are interior metal projections in the cylinder which become very hot.

There is always some slight leakage past the valves and piston, but this leakage increases directly with the pressure in the

cylinder, and therefore makes very high compression inadvisable.

The excessive initial pressure when high compressions are used throws undue strains on all working parts, and increases the wear on the bearing surfaces. With high compression there are greater fluctuations in the power transferred to the piston, consequently a larger flywheel must be used and the engine is likely to vibrate more in operation. Finally, the higher the compression the more difficult it is to start the motor, because the operator must compress the first charge (or several) by hand.

It will thus be seen that there are both advantages and disadvantages in high compression as compared with low, and as a result a "golden mean" is usually adopted. In four-cycle, water-cooled vehicle motors the compression is usualty carried at between 60 and 90 lbs. gauge pressure per square inch. In the motors of racing cars a higher compression is used (to get all the power possible), and in air-cooled and two-cycle engines a lower compression—in the former because, owing to the lesser cooling facilities, the tendency to preignition is greater, and in the latter probably because it is difficult to get the compression space small enough.



COMPRESSION CURVE.

LAW OF COMPRESSION.

The pressure of compression obtained in an engine depends primarily upon the ratio of the compression space volume to the volume swept through by the piston in one stroke. The theoretical compression is calculated upon the basis that the pressure prevailing in the cylinder at the beginning of the compression stroke is equal to atmospheric pressure, that there is no leakage of combustible mixture from the cylinder during the compression stroke, and that heat is neither abstracted from nor imparted to the gases from outside sources during the compression period. The actual compression is probably always somewhat below the theoretical, because none of these three conditions is perfectly satisfied. That is to say, there is always a slight leakage past the valves and piston; the pressure in the cylinder at the beginning of the compression stroke is not quite atmospheric, especially at high speeds, and some of the heat developed by the compression is absorbed by the cylinder walls toward the end of the compression stroke. However, in a good motor the actual compression should not be more than 10 per cent. below the theoretical.

Compressing the gas to one-third or one-fourth its original volume requires, of course, a good deal of work, and considerable power is absorbed during the compression stroke, this power being given out by the flywheel and other moving parts, the speed of which is reduced during this stroke. All this power is stored in the gas, however, and is given out again during the power stroke.

GAUGE PRESSURE AND ABSOLUTE PRESSURE.

There are two methods of stating the compression pressure, viz.: as so many pounds per square inch absolute pressure or so many pounds per square inch gauge pressure; and in order to avoid misunderstanding, it is always well to state whether absolute or gauge pressure is meant. As is generally known, the pressure of the atmosphere is equal to about 14.7 lbs. per square inch, and the absolute pressure is therefore always 14.7 lbs. greater than the gauge pressure.

In compressing gas in the cylinder, the pressure rises more rapidly than the volume decreases, because of the heating of the gas by the compression. If means were provided to deprive the gas of the heat generated by the compression, the pressure with decreasing volume would follow the well-known law of gases, that pressure and volume are inversely proportional. For instance, if a volume of gases at atmospheric pressure were compressed to one-half, it would show a pressure of two atmospheres. But if the heat generated by the compression is allowed to remain in the gases, the increase in pressure will be much more rapid.

COMPRESSION DIAGRAM.

In the figure herewith is shown a sectional view of an engine cylinder, with piston. The inlet and exhaust valves are shown located in the cylinder head and nearly flush with the inner surface of same, so that the space back of the piston head is always a perfect cylinder. The piston is shown at the end of its outward stroke, and the cylinder is supposed to be full of explosive mixture at atmospheric pressure. If now the piston is forced back, the valves being closed, the pressure of the gases in the cylinder will rise, the pressure at any particular point of the stroke being indicated by the curved line drawn in the cylinder. The atmospheric pressure is represented by the lowest horizontal line, and all higher pressures up to 70 lbs. gauge by parallel horizontal lines. The length of the cylinder has been divided into equal, numbered parts, and the pressure obtaining in the cylinder for any particular position of the piston can readily be found by locating that particular point on the lowest horizontal, or base line, passing up vertically until intersecting the compression curve, and from the point of intersection passing horizontally to the scale on the right, where the pressure can be read off in pounds per square inch gauge pressure.

It will be seen that when the volume of the gas has been reduced to one-half, when the piston head is even with the vertical line marked .5, the pressure is equal to 22 lbs. gauge; when the gases have been reduced to one-quarter of their original volume, the pressure is equal to 76 lbs. per square inch gauge; and when the gases occupy only one-fifth their original volume, the compression is about 107 lbs. above atmosphere. which, as stated, is about the limit of compression ever used in practice.

Exports for May.

The exports of automobiles and parts from the United States during the month of May last were valued at $171,272, and during the eleven months ending with May, at $1,713,807. The figures for the corresponding periods a year earlier were $144,271 and $1,038,792 respectively. While the export of automobiles and parts has steadily increased during the last three years, the export of cycles and parts, the figures for which immediately precede those for automobiles, have as steadily decreased during this period.

A project is under consideration to build a toll road over the bad stretch of 22 miles between San Francisco and Redwood City. The plan has aroused much enthusiasm among local automobilists, many of whom have agreed to purchase of the bonds to be issued. It is believed that a toll of $2.50 for the round trip would give a good income upon the investment.

MAINTENANCE AND REPAIRS

[Suitable contributions to this department, accompanied by sketches, are solicited and will be well paid for.]

Filtering Gasolene.

By Frank N. Blake.

Because of the small openings through which gasolene must pass on its way from the tank of an automobille through the carbureter, it is important that the gasolene be kept as free as possible from all foreign matter. An extremely small quantity of gasolene is used per cycle, and its flow is controlled by admitting it through a very contracted opening, especially when the engine is running slowly under throttle; therefore, the flow, if not stopped altogether, will be unduly retarded and made irregular by a very small obstruction. Thus the proper proportion of gasolene vapor and air in the explosive mixture, which is the very life of a gasolene engine, will be disturbed, and the engine will either fail to develop the proper power or it may stop altogether. Some carbureters are quite sensitive to water, and a little of it in the gasolene has been known to cause untold trouble. Because of using more gasolene, and also because it is used under pressure, steamers are less liable to suffer from dirt and water in the fuel than are explosion engines, but even steamers are not wholly exempt from trouble on this account.

IMPORTANCE OF FILTERING.

It is, therefore, of prime importance that all gasolene be carefully filtered when it is put into the tank of an automobile, and as this is quickly and easily done, there is no excuse for neglecting this most reasonable precaution. A little care while in the peace and quiet of the auto house may save a serious holdup either in the city surrounded by the inevitable gang, or off in the country, "far from home and mother." Taking a clogged carbureter apart, cleaning it and putting it together again on the road, even under the most favorable circumstances, is an experience one is not likely to forget or care to repeat. Some troubles cannot be guarded against, but dirty gasolene is something which need never cause inconvenience. Therefore, let it be repeated, gasolene should always be carefully filtered, ever bearing in remembrance the trite little proverb about the comparative value of a small amount of prevention and a much larger quantity of cure.

Fine wire gauze, cloth and chamois are used for filtering gasolene, and probably all three materials do the work fairly well, but acting on the principle that whatever is worth doing is worth doing well, it seems best to use chamois for this purpose; it is certain that neither water nor dirt will go through chamois, though gasolene flows through it with surprising freedom.

A common method of using chamois is to spread it over a funnel and then pour the gasolene through it, but this way is open to objections; the leather lays against the funnel and hinders the free flow of gasolene, and this occasions a waste of time and also of gasolene through evaporation. The next time the filter is used the dirt strained from the gasolene the last time it was used will be washed into the tank, unless care is taken to always use the right side of the filter. At any rate, both funnel and chamois are liable to be dirty, unless they are put away and kept more carefully than is commonly done.

COMBINED FUNNEL AND FILTER.

A good funnel and filter combined is made by taking a tin can or pail of suitable size and provided with a shut-over cover, and suspending a circular piece of chamois in it by sewing it to a wire ring fitting the inside of the can and held near the top by three little tin lugs soldered to the inside of the can; a spout soldered into the bottom at the corner and provided with a cap completes the device. The chamois should bag down, but not quite touch the bottom of the can. The cover keeps the filter clean, and to a considerable extent prevents the evaporation of the gasolene which is left in the leather, and the cap on the spout contributes to the same end. This filter works very rapidly, as there is a large area to the filtering medium and it all hangs clear of any obstruction, besides having considerable pressure on the lower part when the filter is kept nearly full.

This filter is convenient to carry if you are traveling beyond the capacity of your tank. Of all times, one should be most careful not to get dirt or water into the tank while away from home, and it is not only less trouble to have your own filter-funnel always at hand, ready to use, but it is also far safer to use it when taking in gasolene at all sorts of places, in preference to the dealer's funnel, which may be both wet and dirty. His measure may be wet and his gasolene dirty, but if they are, no harm will result if the gasolene is poured through your filter.

CONVENIENT SIZE OF FUNNEL.

A can four inches in diameter and four or five inches deep is a good size to use, and, of course, is less bulky to carry than a larger one. A larger one is more convenient for pouring into from a full gallon measure, though the smaller one does very well unless some part of the car is in the way.

Besides taking water out of gasolene, chamois will also take gasolene out of water, depending upon which liquid first gets possession of the pores of the leather. In actual use there is no danger of getting water into the filter before gasolene. If the mixture is poured into the funnel, the water, being heavier, will stay at the bottom of the vessel and go out after the gasolene has soaked the filter. If the liquids were drawn from a can through a faucet at its bottom and if the leather was dry and a large quantity of water was in the can, such a thing might happen.

This brings to mind the occasion when a certain automobilist's small boy amused himself during his father's absence by pouring water into a five gallon can which stood on the floor in the barn. This man at that time did not filter his gasolene through chamois, and when his motor refused to go, he eventually discovered the presence of five quarts of water in his gasolene tank. Of course, the story got out among "the boys" and since then a mixture of water and gasolene has come to be known among them as "Risley's mixture," and is never recommended for automobile fuel.

Amalgamation Plans Dropped.

The proposed amalgamation of the American Automobile Association and the American Motor League under the name of the American Motor Association was declared off at a meeting of the A. A. A. directors last Wednesday. The official statement issued in the name of H. W. Whipple, the president, was as follows:

"The proposed merger between the American Automobile Association and the American Motor League will not take place, since the committees which were appointed to draw up a constitution did not agree, this agreement on constitution having been a condition precedent to the proposed merger."

The hitch in the relations between the two associations arose over the question of representation in the election of the governing board of the joint organization. C. H. Gillette, who resigned his secretaryship in the A. A. A. rather than take any part in the proceedings, is back in his position, in place of S. M. Butler, who held the office temporarily. Mr. Gillette has named A. B. Tucker as assistant secretary.

Trade Literature Received.

Pope Mfg. Co., Hartford, Conn.—Catalogue of the Pope-Hartford automobile. Catalogue of Columbia motor bicycles. "How to Operate Pope-Tribune Automobiles." "Instructions for Operating Pope-Hartford Automobiles," "Timely Hints for Motor Cyclists." "Why the Motor Bicycle?"

H. W. Johns-Manville Co., 100 William street, New York.—Price list of insulating materials.

Cullman Wheel Co., 521-525 Larrabee street, Chicago—Circular and price list of the Cullman spur equalizing gear.

The Bullock-Beresford Mfg. Co., Cleveland, O.—Descriptive circular of the Bullock igniter, done up in a cannon cracker shell, with the advice: "This cracker will not explode; if you want explosions, particularly in a gasoline motor, just get Bullock ignition.

New Vehicles and Parts

The Acme Touring Car.

The Acme Motor Car Co., of Reading, Pa., have recently brought out a new design of touring car, following Mercedes design in some respects, although it is of the light or medium weight touring car type and the motor has only two cylinders. Among the features reminding one of Mercedes construction are the double chain drive, ball bearing change gear box, sliding pinion shaft with four integral keys (instead of being squared), a threaded sleeve and shank steering mechanism, etc. The design embodies many minor novel features which are fully described in the following article:

THE FRAME.

The frame is constructed of ash sills reinforced by cold rolled steel plates ¼ inch thick by 3 inches high. It is narrowed slightly in front, to permit of turning the steering wheels through a larger angle and turn the car around in a shorter radius. The front and rear cross members of the frame are also of ash and reinforced. A channel steel sub-frame, composed of two extra heavy longitudinal bars and two cross bars, supports the engine and the transmission gear. The frame is very solidly constructed, with reinforced corner plates, and is supported by platform springs both in front and rear, giving an unusually elastic suspension. The cross member of the rear spring is clipped to the rear frame cross member, and the forward ends of the rear springs are shackled to malleable spring brackets riveted to the frame sills. The cross member of the platform spring in front has a swivel connection with the front transverse frame member, and in order that the free play of the front axle thus allowed may not strain the front side springs, the latter are provided with a universal joint connection at their rear end, of special design, as illustrated in Fig. 3. As shown in this figure, the end of the main leaf A is looped to receive a bolt pivoting it to the ring B. The latter is supported in a socket turned in the bracket C, in which it is free to rotate, and is held from endwise motion by means of the annular cover plate D. In a number of American cars a single transverse front spring is used, which is pivoted to the body frame at the center, to allow the front axle to accommodate itself to any unevenness in the road surface. This same object has been aimed at here, and has been fully attained; in addition, the suspension of the platform spring is very much better than that of a single transverse spring, and no distance rods from the frame to the axle are required, as with the older arrangement, the side members of the platform spring performing this office. The side springs are free to compress and extend, and are not subjected to any twisting strains by relative motion between body and axle.

Both the front and the rear axle are of 1½-inch solid steel, and the front axle is provided with forged steering knuckles pinned and brazed in place. The wheels are of the artillery type, 30 inches in diameter, and fitted with 3½-inch clincher tires, purchasers being given an option on Diamond, Fisk and G. & J. The road wheels run on ball bearings consisting of one row of ⅝-inch balls and one row of ⅜-inch balls. The front and rear wheels are identical, except that a combined

Fig. 2. Sketch of Front Platform Spring.

sprocket and brake drum is bolted to a flange on the hub of each of the rear wheels.

THE MOTOR.

The motor is of conventional design, and embodies few exclusive features. It is of the high compression type, compressing to in the neighborhood of 100 pounds absolute. It is a twin cylinder vertical machine, with cylinders of 4 inches bore and 5 inches stroke, the two pistons operating on a double throw crank shaft with the two throws set opposite, or at 180 degrees to each other. It is claimed to develop 16 h.p. at 1,000 revolutions per minute. The crank shaft is drop forged, with 1⅝-inch pins and main journals and three bearings, one between the two throws. The flywheel is fitted to the crank shaft with a tapered, keyed joint. The connecting rods are drop forgings and fitted with brass bushings at both ends, those at the crank end being split, and consequently adjustable for wear. The two cylinders are cast separately, each integral with its head and valve chamber, and are secured to the aluminum crank chamber by four substantial stud bolts each, with nuts on both ends, no reliance being placed

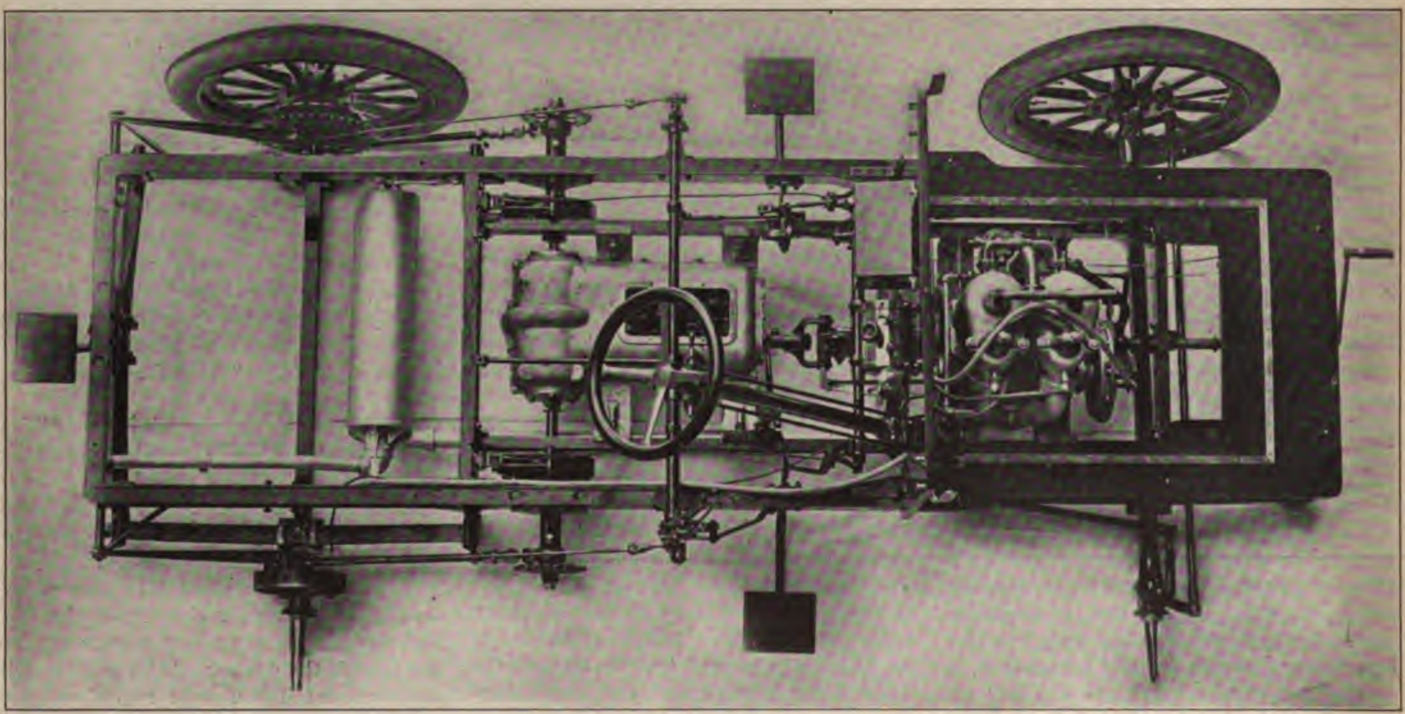


Fig. 1.—Plan View of Chassis of Acme Touring Car.

upon a thread in the aluminum. The aluminum crank case is cast in two halves, being divided in a horizontal plane through the center of the crank shaft bearings. It is provided with a plug-closed opening for introducing lubricant, and two oil cocks at the bottom, one of these being provided with a stand pipe rising into the case to the height at which it is desired to keep the oil level, and the other serving to drain the case. The cam gears and governor are separately enclosed in an aluminum case, consisting of two parts. One of these is provided with hubs bored out to fit over the hubs for the crank shaft and cam shaft bearing, over which it is slipped, and then bolted in place to the crank case by means of radial flanges cast on the hubs. The other part of the cam gear casing is a substantially flat plate bolted to the first part.

The exhaust valves are made from drop forgings, and have a free diameter of 1⅝ inches. The automatic inlet valves are turned from the solid bar, have a clear diameter of 1 11/16 inches and a lift of ⅛ inch. The inlet valves are located in cages which are held in position by a cast brass inlet fitting of Y shape, the latter being held down by drop forged yokes and set screws. The yokes are held to the cylinder casting by cap screws, which pass through lateral slots in the ends of the yokes. To remove the inlet valves—which can be taken out complete with their seats and springs—all that is necessary is to loosen the set screws a turn or two and swing the yokes around, when the inlet fitting can be swung back and the valve cages taken out.

The cam shaft passes through the upper part of the crank chamber, and to it are fastened the hardened steel cams, which are pressed, keyed and pinned on. The cams act on hardened steel cam rollers at the lower end of the valve push rods and the upper ends of the push rods are provided with hardened steel insets, to prevent wear. The valve spring bears against a countersunk washer on the valve stem, resting on a tool steel cotter pin passing through a slot in the stem. The exhaust gases from the valve chamber pass through a Y fitting with easy bends and flanged joints, and through a long steel pipe to the muffler located transversely in front of the rear axle.

The flywheel is 15¼ inches in diameter and weighs 80 pounds.

CARBURETOR AND GOVERNOR.

A float feed carburetor is used which is located at the side of the engine opposite the valve chambers and connected by a brass tube to the inlet Y. It has a specially treated cork float acting directly on the gasoline valve without intermediary mechanism. The gasoline enters the float chamber on top, where it passes through a straining screen. It is sprayed through a multiple nozzle and its flow is controlled by means of a conical hand valve. A drain cock is provided at the bottom of the float chamber.

The throttle valve is combined with the carburetor, and is operated by means of a centrifugal governor at the forward end of the crank shaft. The carburetor has both a main and a supplementary air inlet, the supplementary air inlet being opened by the governor a little faster, proportionally than the gas passage. The spraying chamber of the carburetor is jacketed, and a portion of the exhaust gases is shunted through this jacket to supply the heat necessary for a

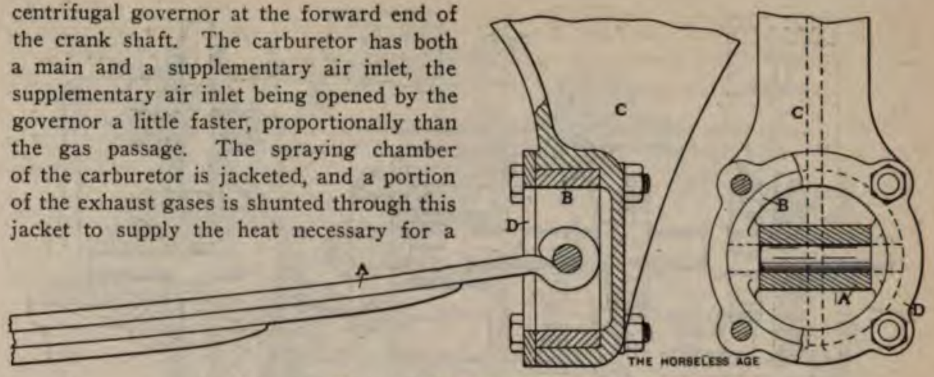


FIG. 3.—SPRING HANGER UNIVERSAL JOINT.

thorough vaporization of the gasoline. The carburetor is primed by means of a rubber bulb conveniently located near the starting crank.

The governor consists of two brass weights in the form of bell cranks pivoted on the ends of a bracket secured to the crank shaft. One arm of each bell crank is turned toward the shaft, and its end engages in a groove on a slidable sleeve on the shaft, which passes through the casing and is provided with a second groove near its outer end. In this groove engages the forked end of a long balance lever, the outer arm of which connects by a link to the throttle valve. The two governor weights are connected by coiled springs which draw them toward the shaft, and the centrifugal force of the governor is further counteracted by a coiled spring extending between the outer end of the governor rod and the front cross member of the body frame. The engine can be accelerated by increasing the tension of this latter spring, either by means of a small handle on the steering column or by means of a pedal. The engine can therefore be controlled either by hand or by foot.

The gasoline tank, of 15 gallons capacity, is made of sheet copper and is located in the front seat. It is provided with partition walls to prevent rumbling.

IGNITION.

Jump spark ignition is used, the spark plugs being located at the side of the valve chamber, between the valves. Current is supplied by one or the other of two dry batteries, of four 3-inch cells each, which are carried under the front seat and can be got at through a door in the tonneau. A double vibrator coil of French construction is carried on the dashboard, being put up in a finely polished hardwood box, with a switch on the outside. The conntact breaker or commutator is located on the a switch on the outside. The contact of a hard rubber casing with contact blocks embedded in its inner surface, and a radial contact pin of tool steel pushed against the interior surface of the casing by a spring. The contact blocks are also of hardened steel and adjustable for wear. The contact breaker is normally held in position to give late ignition by a spring, and the spark can be advanced by means of a handle on the steering column.

COOLING SYSTEM.

The cooling water is circulated by means of a centrifugal pump built integral with the engine, and positively driven from the crank shaft at twice the speed of the latter. The radiator, located at the front end of the bonnet, consists of 24 tubes of an aggregate length of 42 feet. The tubing is ⅞ inch in diameter and is provided with 2-inch copper flanges, painted a dull black. The tubes are arranged six high and four deep, and are connected all in one series. A copper water tank is located above the radiator. The total capacity of the cooling system is six gallons. The pump takes the water from the bottom of the radiator and forces it into the bottom of the jacket; from the top of the jacket it flows to the tank and from there to the radiator. A special filling arrangement is used, which prevents air locks in the system in filling. The filling cap is located on the top of the

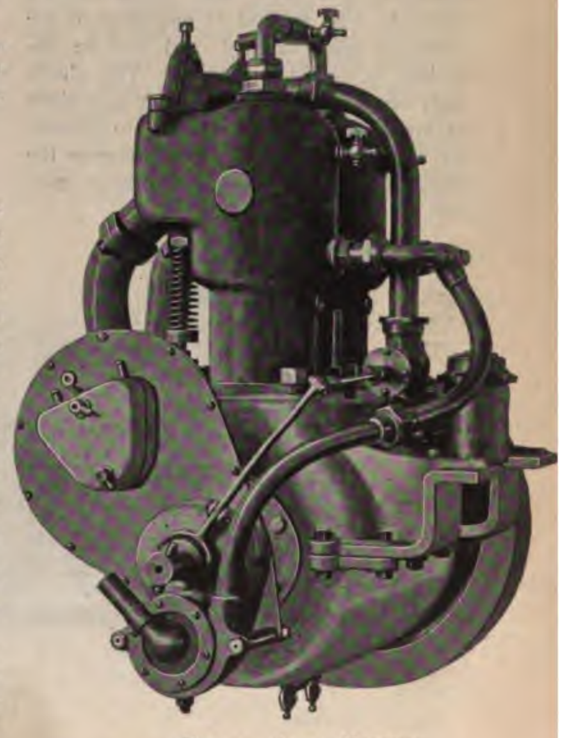


FIG. 4. ACME ENGINE.

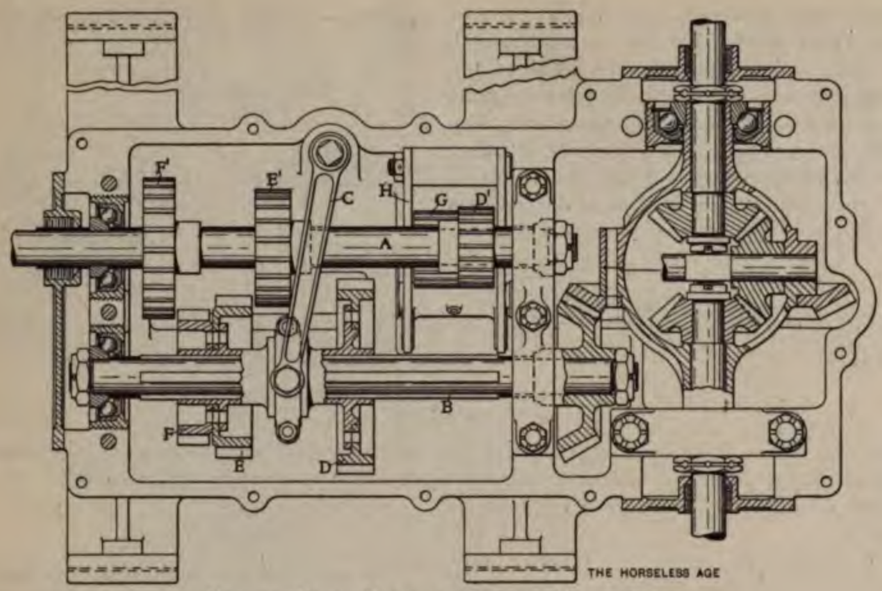


FIG. 5.—PLAN VIEW OF CHANGE SPEED GEAR.

tank, but the filling opening does not communicate directly with the tank, but a pipe leads from it directly to the lowest part of the system, near the bottom of the radiator. The top connection to the jacket is in the center of the cylinder head. An overflow with a rubber hose attached is provided at the top of the tank.

LUBRICATION.

The engine is lubricated by splash, oil being fed to the crank chamber through an opening provided for this purpose. The outer crank bearings are lubricated from an automatic oiler on the dashboard.

The flywheel is recessed to receive a conical clutch cast of aluminum and faced with leather. The clutch cone is turned to an angle of 15 degrees and is held in engagement by a heavy steel spring entirely inclosed. The method of operation of the clutch is quite original, and will be described in detail further on. The clutch shaft connects to the first change gear shaft by means of a universal joint, to provide for any possible disalignment between the bearings of the engine and change gear box.

THE CHANGE GEAR.

The change speed gear is of the sliding-pinion type, and gives three forward speeds and one reverse, the different forward speeds being all secured by a single lever, while the engagement of the reverse gear requires the operation of a foot button. The change gear, bevel gear drive to the countershaft and differential gear are all enclosed in the same casing, which is cast in two parts, being divided in a horizontal plane. The upper half simply forms a cover, all bearings being entirely supported by the lower half of the casing and provided with removable caps. A plan view of the change speed gear with the cover removed and partly in section is shown in Fig. 5. It will be noticed that all the shafts are mounted on ball bearings. The balls on the change gear shafts are of ½ inch diameter and those on the countershaft ⅝ inch. At the three points where shafts extend through the wall of the casing the bearings are packed, to render the case perfectly oil tight. With the same end in view, oiled paper gaskets are inserted between the upper and lower half of the casing.

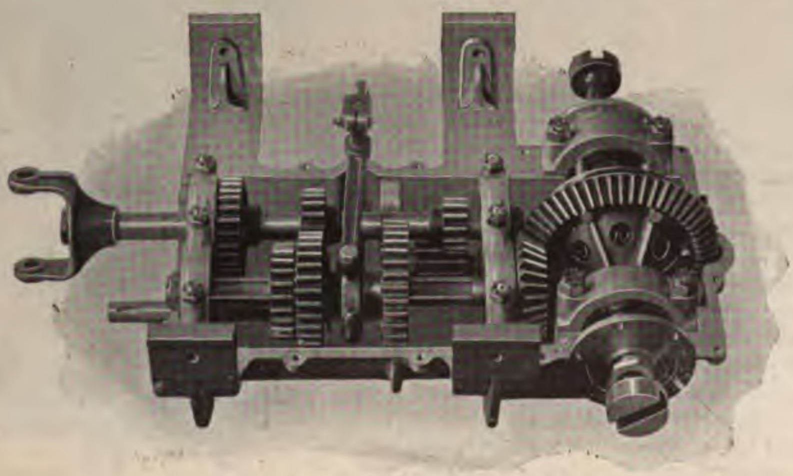


FIG. 6. ACME CHANGE SPEED GEAR.

The gear comprises two parallel shafts, the shaft A receiving its power from the engine and shaft B transmitting it through a set of bevel pinions to the transverse differential shaft. Upon shaft B is mounted a set of three sliding pinions, which are controlled by means of a forked shipper lever C. The shaft B is made with four integral keys, and is case hardened, and the bronze sleeve or center to which the three sliding pinions are bolted is cut with correspnding keyways. It is the usual custom to make the shaft on which the sliding pinions are mounted square, but it is claimed that with this construction there is always a wedging or binding action which opposes the sliding motion of the pinions and tends to an early destruction of the shaft and sleeve. With the construction here employed, the rotary effort transmitted from the sliding pinions to shaft B comes squarely on the side faces of the keys, and all binding or wedging action is avoided. It will be noticed that each of the three sliding pinions can be replaced separately when worn.

The pair of gears DD' gives the first or lowest forward speed; the pair EE' the second or intermediate speed, and the pair FF' the third or high speed. The reverse is obtained by means of the low speed pair D and D' and an intermediate pinion G, which is journaled in a swinging frame H. The set of sliding gears is first moved into such a position that gear D is adjacent to pinion D', and the frame H is then swung around its pivot by means of the foot button provided for this purpose, to bring intermediate pinion G into mesh with both D and D'. To prevent the possibility of the reversing gear being thrown in accidentally at inopportune times, the gear operating lever at the side of the seat and the reversing foot button are interlocked, so that the button can only be depressed when the lever is in a certain position.

The three forward speeds bear to each other the relation of 1:2:3. The pair of bevel pinions transmitting the power to the countershaft gives a reduction of speed of 9:5. All gears used are 6 pitch, the change speed gears being of 1⅛-inch face and the bevel gears of 1¼-inch face. The change gears are drop forged and case hardened. The differential gear is of the bevel type, and its steel casing is provided with long hubs which extend through the ball bearings on the side of the gear. These bearings are provided with means for adjustment, primarily to allow of adjusting the bevel gears. The pinion of the bevel gear set is of steel and the wheel of bronze. A point on which particular stress is laid is that when the car is operated on the low gear, when the transmission strains are naturally the greatest, the reactions between the low-speed gears on the one hand and the bevel gears on the other are in opposite directions, thus largely relieving the bearing between them of pressure.

The countershaft is also supported in ball bearings at either end, and each of its two

halves is provided with a universal coupling of the Oldham type, to allow for disalignment between the inner and outer bearings. The countershaft at its outer end carries the driving sprockets, which are made in three sizes, viz.: with 18, 20 and 22 teeth, according to the topography of the district in which the car is to be used, and the wishes of the purchaser. The rear-driven sprockets have 42 teeth, and are connected with the drivers by 1-inch pitch chains of the new Baldwin detachable type.

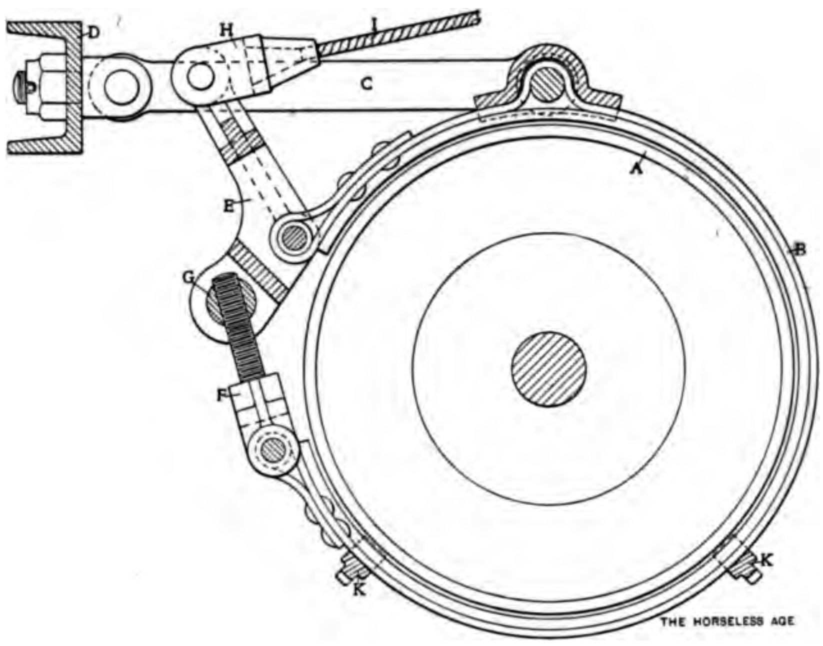


Fig. 7.—Countershaft Brake.

BRAKES.

The car is fitted with two pairs of double acting brakes, one pair acting on the countershaft and the other on drums secured to the rear wheel hubs. The former are of the band type and the latter internal expanding. The band brake is illustrated in Fig. 7. In this figure A represents the drum, which is encircled by the leather lined steel band B. The steel band at its highest point is secured in a somewhat peculiar manner to links C, which are anchored to the transverse frame channel D. One end of the steel band is secured to a bell crank E and the other to a forked connector F, with a threaded stem passing through a trunnion G supported in the forked end of the bell crank E. To the opposite end of the bell crank E is pivoted a forked connecter H at the end of the steel cable I. It is obvious that when a pulling force is applied to the steel cable I, the steel band B is contracted on the drum A and exerts a strong braking action on the latter. The reaction of the brake effect is taken up by the links C. When the brake is released, the lower part of the band B rests on guards KK, and prevents the upper part of the band from dragging on the drum. The band brakes here described are operated by means of the clutch pedal, the steel wire rope I passing through the hollow clutch pedal shaft and over grooved lever arms, to provide an equalizing action.

The rear wheel brakes, as already stated, are of the expanding type, and are operated by a hand lever at the side of the seat, working on a ratchet sector. The reaction of the brake effect in this case is taken up by distance rods running to brackets extending outward from the rear end of the frame.

CLUTCH AND BRAKE OPERATING MECHANISM.

Fig. 8 illustrates the arrangement of the clutch and brake operating mechanism. A and B are two concentric tubular shafts mounted in bearings on the sub frame. The foot pedal for operating the clutch and the differential brake is brazed to the shaft A at its right hand end, and the lever B is brazed to this same shaft at the opposite end. The outer end of lever B connects through a slotted link I with the lever F on the cam shaft G, to which is keyed the cam N. This cam acts on the lever H pivoted to the end of lever C, which is braced to the left hand end of the tubular shaft D. To the right hand end of this shaft is brazed the clutch lever E. It is obvious that when the clutch pedal is pressed forward the cam shaft G is turned in a right hand direction, raising the levers H and C and drawing the clutch out of engagement.

M represents the hub-brake lever, which is fastened to a shaft O, from which depends a lever K connected by a slotted link L to the lever F on shaft D. It will be readily seen that when lever M is pushed forward, to apply the brakes, the link L causes the cam shaft G to be simultaneously and automatically rocked through a certain angle and the clutch disengaged thereby.

As already stated, the differential brakes are operated through an equalizing steel wire cable (P), which passes through the hollow shaft A and over cable dogs bolted to lever B. It will be noticed that the cam N has a concentric portion which passes under the cam roller last. When this portion is under the cam roller, the clutch is out of engagement, and the movement of the clutch pedal while the concentric portion of the cam passes under the cam roller applies the differential brake. In this way only a single pedal is required for operat-

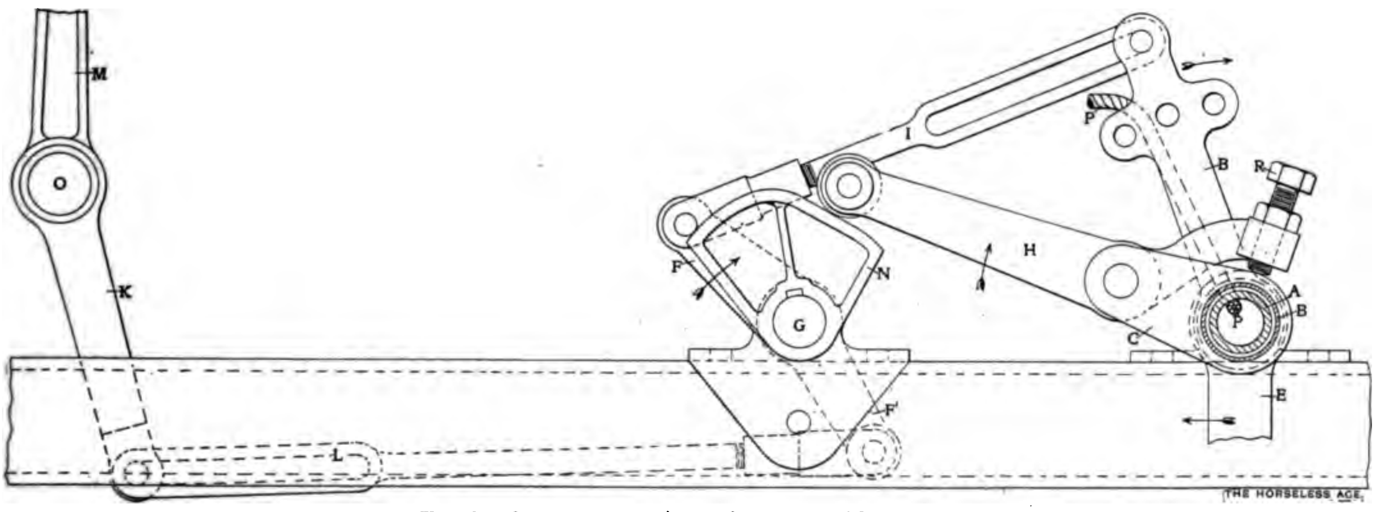


Fig. 8.—Clutch and Brake Operating Mechanism.

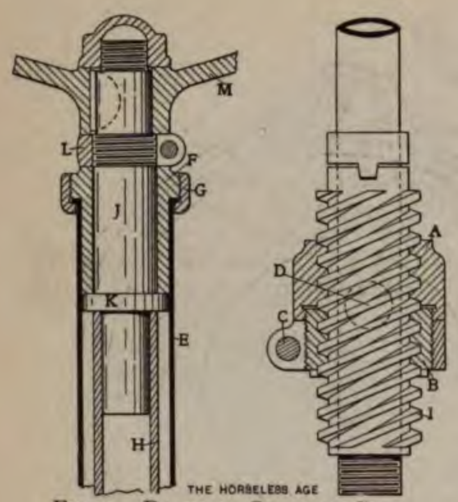


Fig. 9. Parts of Steering Gear.

ing the clutch and the foot brake, which considerably simplifies the operating mechanism, and the arrangement is said to have been found thoroughly practical. The clutch can be adjusted by means of the set screw R.

Fig. 10.—Steering Gear.

THE STEERING GEAR.

The car is steered by means of a hand wheel with wood rim and brass spider on top of a nickel plated 1½-inch tubular steel column inclined at an angle of 50 degrees. This column is clamped at its lower end in a base of malleable iron. The steering apparatus complete is shown in Fig. 10, and some of the details of the device in Fig. 9 The steering motion is transmitted through a back lock mechanism consisting of a quadruple threaded worm and a correspondingly threaded sleeve. The latter is in two parts, threaded together, to provide means of adjustment. In case any play has developed the part B can be slightly turned in the part A, which will take out the play, and can then be locked from getting out of adjustment by means of a clamping bolt C. The part A is provided with two opposite radial trunnions D passing through suitable bearings at the end of the shorter arm of a two-part bell crank (see Fig. 9), the longer, downwardly extending arm of which is connected by a link to one of the steering knuckles. In most constructions of this type a sliding joint is required between the threaded sleeve and the bell crank, but the necessity for this joint is here avoided by making the steering shaft H free in the column at the lower end and supporting it only at the upper end, in a thrust bearing, so that the lower end of the shaft is capable of a slight lateral motion, which the angular motion of the bell crank calls for. The necessity for a sliding joint, with its attendant liability to develop wear and back lash, is therefore dispensed with.

Referring to Fig. 9, it will be seen that the upper end of the tubular steering column E is flanged outwardly, and a bushing F is secured in the end of the column by means of a gland G. The central part H of the steering shaft consists of a heavy-walled 1-inch steel tube, which at its lower end has secured to it the quadruple threaded worm I and at its upper end a spindle J. This spindle J is provided with a collar K just fitting inside the tubular column E and bearing against the lower end of the bushing F, thus affording a thrust bearing. The spin dle J, where it projects from the bushing F on top, is threaded to receive a split nut L, by means of which adjustments can be made. To the upper end of the spindle is keyed the steering wheel spider M. All the bearings of the steering device are brass bushed. It will be seen from this description that the steering apparatus is made very carefully throughout, and that means for adjustment are provided at all possible points.

One and one-half revolutions of the hand wheel will move the forward road wheels from hard over one way to hard over the other way. The limit of motion of the steering wheels to each side of the straight ahead position is 40 degrees and the car can be turned in a 24-foot circle. The link running from the steering lever to one of the steering knuckles is tubular and is provided with adjustable ball joints at either end. The connecting rod between the two steering knuckles is arranged in front of the axle and has forked joints at its ends.

The car is fitted with a tonneau body constructed of three and five-ply laminated wood. It will carry five persons, being provided with a sliding seat resting on the two regular tonneau seats. This sliding seat was substituted for a seat hinged on the tonneau door, formerly used, and is thought to be an improvement on same. When not in use it can conveniently be carried on the floor of the tonneau. The car has all spring seats and hand-tufted leather upholstery. A long, curved-top bonnet, not unlike the Mercedes bonnet, is used, which is provided with side doors for ready inspection of the engine. The car complete weighs about 1,800 pounds, and is geared to give a speed of 21 miles per hour with an 18-tooth driving sprocket and at 1,000 revolutions of the engine. By accelerating the engine, consideraly higher speed can, of course, be obtained.

A New Air Cooling System.

A new air cooling system for gasoline motors has been inventd by H. J. Muntz, 32 Columbia street, Poughkeepsie, N. Y.,

Muntz Air-Cooled Cylinder.

and is shown by the several illustrations herewith. The cylinder and valve chamber are provided with stamped steel radiating flanges which are cast right on to the cylinder in the mold. It is claimed that with the ordinary method of constructing flanged cylinders, by casting the flanges on, it is impossible to get more than four flanges per inch, while with this system the flanges can readily be set as close as seven

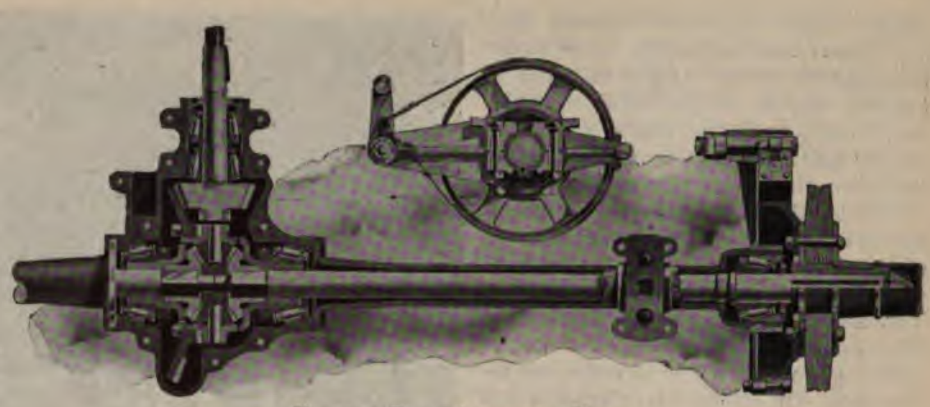
:h, and a much greater radiating sur-
n therefore be obtained. The flanges
rforated with oblong slots, to obtain
r circulation of air, and also to take
ain off the cylinder wall in casting.
ll be seen from the drawing, the
ngs are formed with dove-tail slots,
re a secure hold in the cylinder wall.
cylinder from which the accompany-
otos were made, and which Mr.
sent to our office for inspection, is
d for a 4x4½ inch engine. It is
ed with 70 flanges on the cylinder
ach eight inches long by one inch
one-half this number of flanges on
d, about one inch by two inches, and
ges on the valve chamber, one inch
ee and a half inches. The total ra-
surface is therefore about 1,450
inches. The slots are $^5/_{32}$ inch wide
inch long. The flanges enter into
inder wall $^1/_{16}$ of an inch, and it is
l that they have a much more secure
an could be obtained by milling the
surface of the cylinder and fitting
ges mechanically. The flanges may
made of annular form, to surround
inder.

her point in which this engine dif-
om most present designs is that of
o superposed valves the upper one
exhaust valve, and the lower one the
valve, the charge arriving through
deg. connection seen at the lower
the valve chamber. The usual ar-
ent is to put the exhaust valve
but this makes it necessary to cut
ges at one side of the cylinder away,
e room for the exhaust valve stem
ring, and the cooling facilities are
much impaired. The spark plug
into the center of the cylinder head.
understand that a patent on this
of constructing air-cooled cylinders
ing.

'imken Bevel Gear Drive Axle.

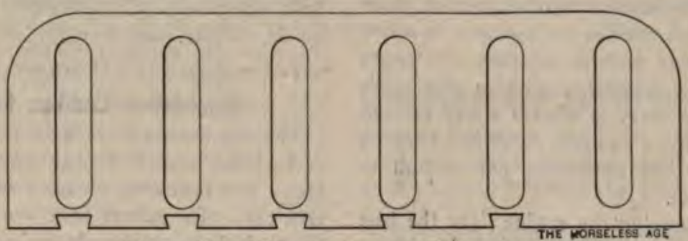
Timken Roller Bearing Axle Co.,
on, Ohio, are now manufacturing a
ear driven live axle under the pa-
f T. J. Lindsay, formerly of In-
lis, Ind. Mr. Lindsay has been
cturing these axles without the
Roller Bearings now used for the
veral years, and his services have
en secured by the Timken Com-

ut herewith shows a sectional view
axles and the brake. In the con-
n of the axle, no brazed joints are
he axle casings being of seamless
nd swedged up on either end. The
gear case is milled out to receive
er end of these tubes, which are
opped into the grooves and bolted.
iving gear case is divided in a
al plane, which is claimed to give
ger construction than a vertically
case, and together with the square
haft ends, it permits of removing



TIMKEN REAR AXLE AND BRAKE.

the shafts and the equalizing and driving gear without removing the axle from the car. The spring seats on the axle sleeves are so arranged that they cannot move sideways, but are capable of a slight angular motion, to prevent any undue strain on the springs due to the reaction of the bevel up end thrust as well as direct downward pressure. Thus the side thrust of the bevel driving gear is taken up on the roller bearing, located directly behind this gear, which is provided with means of adjustment. Strong claims are made for the axle with regard to its neatness and lightness. It is



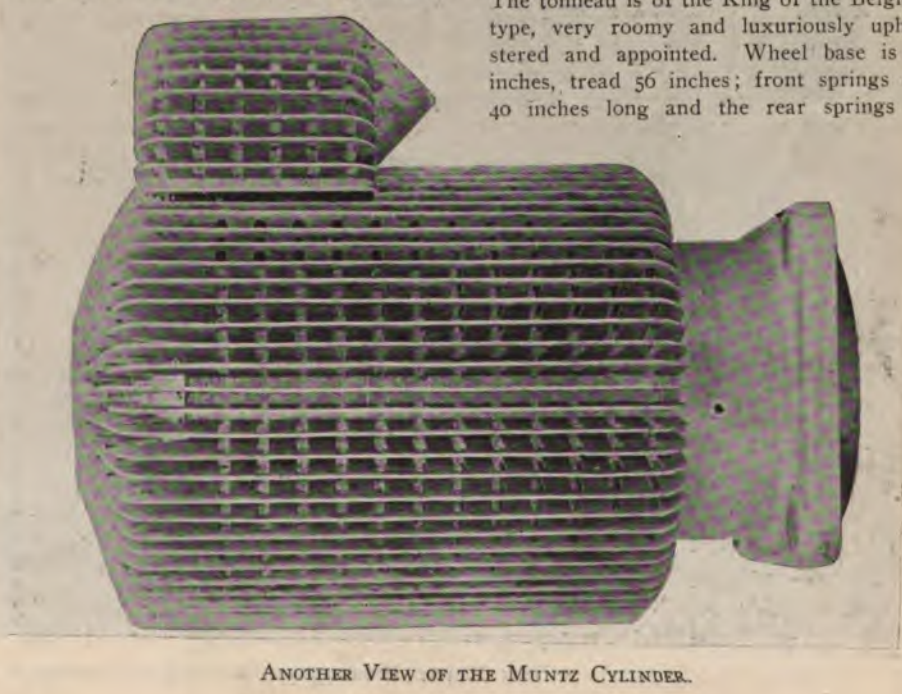
VALVE BOX COOLING FLANGE (FULL SIZE.)

driving gears. A tubular torsion rod is furnished with the axle to take up the reaction of the bevel gears, or their tendency to climb. The axle truss rods enter the gear case on the side, instead of at the bottom, thus giving a greater road clearance.

The axle is mounted on Timken Roller bearings throughout, which, as is well known, are of the tapered variety, and take made in various sizes to adapt it to different weights of cars.

A New White Model.

The White Sewing Machine Company announce some of the details of the 1905 car known as "Model E," which is herewith illustrated. The 1905 White is a much larger car and is rated at 15 horse power. The tonneau is of the King of the Belgians type, very roomy and luxuriously upholstered and appointed. Wheel base is 92 inches, tread 56 inches; front springs are 40 inches long and the rear springs 44



ANOTHER VIEW OF THE MUNTZ CYLINDER.

inches; wheels are of the artillery type, 34x4 inches rear and 32x3½ inches front; tank capacity gasoline 15 gallons, water 15 gallons; mileage on one filling of tanks, 150; weight, 2,000 lbs.; regular equipment, oil side lights, tail light, mud guards, horn, tire repair kit and complete tool kit.

Probably the most noteworthy feature of the new car is the arrangement for the elimination of any necessity for pumping water by hand after the car is once primed. This is accomplished through providing a hill-climbing gear, consisting of a pair of sliding gears enclosed in a casing on the rear axle. On a long, heavy grade it will be found desirable to run on this low gear, which, besides increasing the torque of the axle, allows the engine to run at a higher speed, thereby furnishing the generator, through the power pump, with an increase of water supply for a continuous climb, no matter how long.

In connection with this hill climbing gear there is a neutral point between the gears at which the engine is disconnected from the car. This enables the operator to warm up his engine and to increase the steam pressure to full amount without any hand-pumping, as there is always water enough in the generator to make steam for running the engine, but sometimes not enough to move the car.

In thus running the engine light the best steaming conditions are obtained without even running the car out of the garage.

REMODELLED CADILLAC, MODEL A.

In the photo the car is occupied by Rol-
flash steam system and designer of the car.
lin H. White, the inventor of the White

Remodelled Cadillac Car.

The cut herewith shows a rebuilt Model A Cadillac with a French touring car effect. The following changes were made in this car: The wheel base was lengthened to 80 inches; a 26-inch combination steel and brass hood was provided, as well as a seven-piece veneered dash; the radiator was brought forward and placed in an upright position, the steering rod lengthened by eight inches, and the tonneau elevated four inches.

This machine is one of six that have been altered in this manner for owners by Walter J. Pursell, 1530 College avenue, Indianapolis, Ind. Mr. Pursell furnishes all the parts necessary to make the alterations, together with a set of ten 8x10 inch photographs showing in detail how the work is done, and it is claimed that with the aid of full printed instructions, also furnished, a good mechanic and helper can complete the job in two days.

1905 WHITE MODEL.

Vehicle Equipment Co.'s Works Burned.

The plant of the Vehicle Equipment Co. at Church avenue and Thirty-sixth street, Brooklyn, was severely damaged by fire early on the morning of July 5, and the company will probably be obliged to move to another location. Several offers of sites have been made, and it is likely that one of these will be selected. The present plant is the property of the Brooklyn Rapid Transit Co. The fire is said to have started by a lighted balloon crashing through part of the roof over the woodworking department that is protected by glass. The flames spread to the paint and blacksmith workshops, which were almost destroyed. The greatest loss was in the burning of 75 trucks, of which nine-tenths were finished, and of parts for nearly 200 vehicles. The electric lighting and charging equipment was destroyed. The battery department, in a separate building, was saved by the efforts of the company's watchman before the arrival of the firemen. The machine shop was not touched by the fire, and the factory was enabled to begin operations with comparatively little loss of time. The works are crippled, however, to the extent of throwing 200 employees out temporarily.

MMUNICATIONS

Delights of Summer Touring.

Horseless Age:

ıeastern Pennsylvania is not only eautiful because of the rolling or inous nature of the country, but be- f the well-tilled farms and the many fruit bearing and otherwise, found he roadside. For the past two years ainfalls have left their effect in the ortions, so that the hilly roads are dly washed into gutters and covered otruding or loose rocks. This sea- level roads are therefore the best of o. Now and for the next week or e cherry trees are loaded with most ıs fruit, which is so plentiful as to ıo value, and eventually falls to the , making an almost unbroken carpet k under each tree. It is one of the s of the auto that on a hot evening of five or ten miles into the country taken and a feast of cherries, fresh, ıd sweet, enjoyed. The best in the are not to be compared with those cks from the top of a vigorous tree

The Marshes near Atlantic City.

xposed to the sunshine. After the s over, a few more miles brings us river, where dressing tents, made buggy covers, are set up by tying ırners to a tree. Bathing suits are ıt out from the parcels box and old oung enjoy a half hour's frolic in warm enough to be pleasant and rom breakers or disagreeable current. ımps are then lighted, and we return ly homeward, cooled, invigorated and d against insomnia for one night at No wonder we enjoy the auto.

ring the past month business and re combined have taken the writer ife southeast as far as Atlantic City, gain northeast as far as New York, n some shorter trips, approximating 1,000 miles. The troubles exper- have been so light as to be almost ıtionable. One sparker needed adjust- low Hammonton, requiring about two es, a broken bolt in the steering, left able to get out of the woods near ıntville until a new one could be had,

A Magnificent Tree near Morristown.

and a punctured tire at Dover required repairing three times before it was permanently fixed. As we returned from Atlantic City on a Saturday, we met 25 autos headed that way, eight of them being stopped for repairs, a much larger proportion of trouble than our own vehicle was giving. We further noted that all of the eight were four passenger vehicles, while the little runabouts seen seemed to drift along merrily. One of the runabouts carried a third passenger perched on top of the rear of the body and evidently enjoying the ride, although not in a comfortable position.

On a level road like the Atlantic City pike, the runabouts unquestionably have ability enough to break the speed laws, and of two vehicles equally well made it is certain that the simplest one will have the least trouble. Such, at any rate, was the impression on our minds after this trip.

While the Jersey roads are far better than those in Pennsylvania in the level parts of the State, they are also more monotonous, for the telegraph poles and scrub pine, as well as the truck farms, all look much alike. In northern Jersey, along the Delaware river, and in Pennsylvania the scenery rivals that of New England, and at each bend of the road and on each hilltop one is tempted to linger, forgetting such things as watches and odometers. A camera frequently pressed into service collected memories that will hereafter be a greater source of pleasure than any record for short time and general road misuse could possibly be. Our only regret is that the opportunity to repeat such trips does not occur as often as we would like.

At Atlantic City the Seashore Machine Works on Baltic avenue, near Tennessee, supplied us with gasoline at 18c. and seemed well equipped for machine work of any kind. At other places the price was higher,

Looking Toward Washington, N. J.

except at the hardware store in Pleasantville, near the turn in the road, where it was sold us for 15c. The nuisance of pushing on and off the ferry boat at Camden can be avoided by turning to the left at Lawnton. The road turns about three blocks above a little stone church, two or three miles above White Horse Inn and passes straight through Westville to the pike between Gloucester and Woodbury. A saloon is seen on the corner, a bridge is in sight down the road to the left toward Woodbury, and two other roads of less importance run into the pike from the same side before the bridge is reached. To reach the ferry, turn right and then take the left fork toward the Gloucester ferry; fare, 30c. This ferry lands in Philadelphia two or three blocks below the Camden ferries, and while the time required is a little longer the mileage is a little less. If automobilists would patronize the ferries that are good to them, obnoxious rulings would probably be repealed. The same thought applies to other objectionable treatment.

Chas. E. Duryea.

Constitutionality of Pennsylvania State Law

Editor Horseless Age:

For the benefit of your readers, will you kindly answer through the columns of your

Valley Forge Village.

valuable paper what is the effect of the decision rendered by a judge in Erie, Pa., with regard to the automobile license law of this State? I have seen one statement that the law was declared unconstitutional and another that the decision had no effect.

Silas Thurston.

[The Pennsylvania State law is still in effect, as far as we know. If a district judge should declare it unconstitutional, the decision would only be effective for his district, and anybody not complying with the law outside of this judicial district would expose himself to arrest under the law.—Ed.]

Law of the Road Regarding Overtaking of Vehicles.

Editor Horseless Age:

Being frequently bothered by a farmer of the neighborhood who regards automobiles as a pestilence, and demonstrates his hate for them by so driving upon the country roads hereabouts that he makes it impossi-

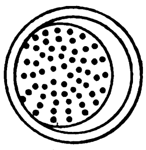


Fig. A.

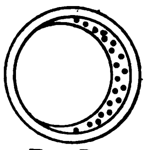


Fig. B.

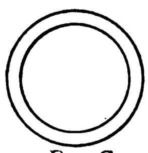


Fig. C.

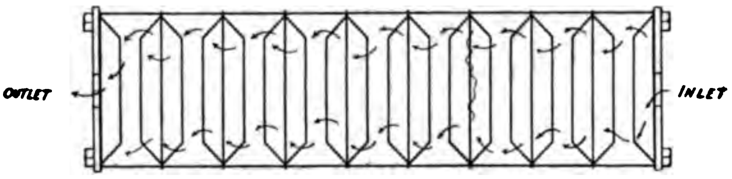


Fig. F.

ble for an automobilist who chances to overtake him to pass, I write to inquire what steps an automobilist can take to force the horseman to allow him to pass and still keep within rights.

Some of us have suspicion that this farmer looks to cause an accident, and thus create grounds for legal action, as a further vent for his spite against automobiles.

Your advice about what is best to do, as well as information as to the legal responsibilities of the auto driver if an accident occurs after repeated touting of the horn, would be duly appreciated. B. J. N.

[W. W. Niles, counsel for the Automobile Club of America, advises us that under sub-division 1 of paragraph 4 of chapter 538 of the New York State laws of 1904, an automobilist overtaking a vehicle on the highway has the right to require that the vehicle shall give way and allow him to pass. The law reads: "The rider or driver overtaken shall, as soon as practicable, turn to the right, so as to allow free passage to the left." The automobilist must, however, use reasonable caution in the assertion of his general right and not attempt to pass the vehicle at an excessive rate of speed, nor where the highway is narrow or the roadbed sloping, so as to make it dangerous to do so; but wherever he sees a reasonable opening and experience teaches him it is safe to pass, he may make an effort to do so. If the party overtaken wilfully or carelessly obstructs him and damages result, the obstructing party is alone liable. If the automobile is injured the automobilist has a right of action from the party overtaken, even if the latter was more damaged than the automobilist.

The caution is urged that in asserting his rights the automobilist must remember that the chief difficulty in the way is one of proof of facts; if damage results, he may be sure the party overtaken will give a false statement of the facts, tending to show negligence or wilful recklessness on the part of the automobilist, and unless the automobilist can establish the true facts by a preponderance of evidence, he is likely to have trouble. To this end the automobilist is wise never to attempt to assert his rights when alone without fair-minded witnesses. If the party overtaken refuses to give way and allow the automobilist to pass, after reasonable time, the latter can follow the other, and when a town is reached take action to cause his arrest. The penalty for refusing to give way and allow the overtaking vehicle to pass is a fine of not more than $25.—Ed.]

A Home-Made Muffler.

Editor Horseless Age:

Mufflers have always interested me, because I am the possessor of a very noisy machine, and have looked with envy upon anyone who has an auto on which they can carry on a conversation when the engine is running.

This, my first offense at muffler designing, was the result of an accident which happened to a friend of mine who owns a gasoline machine. This friend, when he wished to drift down hill, would cut out the spark by throwing out the switch and let the engine be driven by the momentum of the car, the gasoline feeding all the while, throwing in the spark again at the bottom of the hill. This would usually result in an explosion in the muffler, which, of course, was full of gas, and would ignite from the first exhaust from the cylinders.

As everything has a limit, he did this once too often, and finally practically blew the muffler to pieces. This was my opportunity, so I immediately set to work to design a cheap muffler, one that would not require the services of an expert machinist.

It occurred to me that the ordinary tin pie plate could be utilized for this purpose. We therefore procured fifteen pie plates, about 6 inches in diameter. Seven of these were perforated with 1/8-inch holes, as shown by Fig. A. The remainder were perforated with the same sized holes on the sides, as shown by Fig. B. These holes were made with an ordinary punch, laying the plate on the end grain of a block of hard wood. This left some of the holes ragged, which, I think, is rather an advantage than otherwise.

We then had a tinsmith make us fourteen light sheet iron cylinders, about 4 inches long and 1/4 inch smaller in diameter than the plates, as shown by Fig. G. The ends were made of 1/4-inch plates (Fig. D) with

Fig. E.

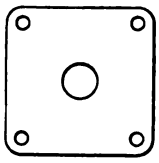


Fig. D.

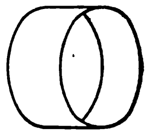


Fig. G.

inlet and outlet holes in the center, and 5/16-inch holes in each corner for the bolts which hold the parts together, which were four 1/4-inch rods, with ends threaded for nuts. (See Fig. E.)

In assembling the parts, we placed one of the end plates on the floor, with the rods in place and the nuts screwed on the lower end, then placed an asbestos washer (Fig. C) on the end piece; next, we put on a pie plate (Fig. B) with the flange down, followed by one of the sheet iron cylinders; another pie plate (Fig. A) is then put in place with the bottom down, upon which place a plate (Fig. B), flange down, with an asbestos washer between. Then another cylinder and plate, as explained above. Repeat until all are used, finishing with the end plate (Fig. D) and screw the nuts on the four rods and the muffler is complete, as shown by Fig. F, ready to apply to the engine.

This arrangement of chambers muffles the exhaust quite well, and if a sufficient number of holes are used will not choke the engine to any appreciable extent.

This muffler, as described, was placed on my friend's machine sometime ago, and up to date has been quite satisfactory, and it was not expensive to build, as most of the work can be done by anyone who has a little mechanical ability.

A Reader.

A Kerosene Launch Engine.

Editor Horseless Age:

Near the end of his interesting article on Progress in Kerosene Burners in your last issue, M. C. Krarup says (in regard to the Diesel engine): "I can see only this hope—that by devising new means for a much more energetic atomization than that which is accomplished by siphoning action, we may be able to get along with much lower compressions than 600 pounds, and yet be able to obtain reliable ignition and combustion with a considerable variation in the composition of mixtures."

Mr. Krarup has overlooked the fact that there is on the market to-day an engine which actually fulfills his "hope." I spent last summer at a small seashore town in company with a friend, an engineer, who has in his boat an engine which was a revelation on the kerosene question. This engine injects atomized kerosene by means of a pump in combination with a peculiar and extremely ingenious ram-like valve, which

nsures sudden admission and power- mization no matter what the speed engine, or the throw of the pump; is by regulating this throw that the t of kerosene injected is controlled. when the engine is unclutched from opeller, its speed can be reduced to slow by simply cutting down the of the kerosene pump; and from e speed may be run up to as fast as safe to let it turn over by simply in- g the pump stroke, and this without ing in any way the air admission. t, there seems to be no question of e at all, as there is apparently al- n excess of air, and the combustion ches more nearly that of a fuel jet g in free air, than an explosion of a ed explosive mixture. The control engine when under way is as perfect gasoline motor I ever saw, and gh I had this engine under observa- l summer, and went off on several trips, I never saw either cylinder single explosion, wet or dry, smooth ugh. How many gasoline engines make this record?

firing is accomplished, not as in the by compressing the air until it is t, but by the heat stored in a flask- ojection on the combustion chamber, is at first heated by a torch, and ards retains its high temperature he heat of the engine. This part of mbustion space is, of course, un- d, and is maintained at a dull red. is no electrical apparatus in the boat, has been said, the ignition is abso- perfect, but has the drawback of tak- minutes or more to get under way. not know just what the compression from the comparative ease of start- ould not think that it is any higher, igh, as the ordinary gasoline engine. Another reason for thinking that the compression is low is the large size of the cylinders for the power delivered. The bulk and weight of the engine, together with a general lack of the refinement found in the better class of automobile motors, would seem to make this kerosene engine as constructed at present quite impracticable for automobiles. But there seems little doubt that an engine working on the same principles could be designed which would be perfectly satisfactory for automobile use, provided always that one is willing to take the necessary time to "get up steam."

C. W. M.

Autos in July 4th Parade.

An automobile parade over a mile long and comprising more than sixty machines was one of the features of Independence Day celebration at Springfield, Mass. The procession comprised all classes of vehicles —light runabouts, heavy touring cars and even delivery wagons—and all were elaborately decorated.

The parade was formed in Sumner avenue, east of Belmont avenue, and started promptly at 10.30 o'clock. It was headed by a Franklin car, occupied by S. L. Haynes and M. T. White, of the committee of arrangements. Following this came a big touring car, trimmed with poppies and American flags. This was driven by F. S. Carr, the third member of the committee.

The route of parade was down Sumner avenue to Fort Pleasant avenue, to Main street, to Jefferson avenue, over a continuous route back to Armory gate on Federal street. The parade arrived at the Armory in time for the National salute at noon.

The first prize, the Knox cup, for the most effectively decorated vehicle, was awarded to a Knox delivery wagon belonging to Forbes & Wallace and driven by Robert Muir. The body of the car was elaborately trimmed in blue and white, and at the front was a gilt eagle with outstretched wings and a bunch of cannon crackers in its mouth. Second prize, the Stevens-Duryea cup, for the most artistically decorated automobile, was secured by John M. Collins, who drove a Knox touring car trimmed mostly in yellow-white, with a sprinkling of pampas grass. The third prize, an order for $10 on the Fisk Rubber Co. for tire repairing, for the most novel vehicle in the parade, was won by the employees of the body department of the Knox Automobile Co.'s works. A double cylinder touring car was fitted with a hay rack and loaded with hay and paraded the vehicle of the twentieth century farmer. A number of the employees of the department acted parts of the up-to-date farmer. A photo of this car is shown herewith.

Tour to the Rangeley Lakes.

Winthrop E. Scarritt, president of the Automobile Club of America, and James B. Dill, a well-known member of the club, started from New York last Monday for an automobile trip to the Rangeley Lakes, Me., via Quebec, Canada. Mr. Dill took the trip to the Rangeley Lakes, where he has a camp, last year, but his route this year will depart from the previous one. The party will go to Montreal, then to Quebec and down to the lakes. The famous route taken by Benedict Arnold in his attack on Quebec will be followed. Mr. Dill will be accompanied by his daughter, Miss Emma Dill, and an extra car will carry a servant, luggage and supplies. He will probably remain at the lakes until October. Mr. Scarritt will spend a week with Mr. Dill at his camp.

AUTOMOBILE IN SPRINGFIELD, MASS., FOURTH OF JULY PARADE.

OUR FOREIGN EXCHANGES

Specifications of Motor Wagons for the French Army.

The French Minister of War has communicated to Max Richard, President de la Chambre Syndicale de L'Automobile, the conditions which the Ministry is propounding for manufacturers desirous of providing commissariat motor vehicles for military use. The conditions practically take the form of a reliability trial to which the competing vehicles are to be submitted. A jury will be appointed by the Ministry of Commerce, and the cars which obtain the three first places, and have satisfactorily gone through all the tests imposed, will be bought for the State. Diplomas will at the same time be given to all competitors whose cars successfully pass all the tests. The chief points to be observed by manufacturers are as follows:

The price of each vehicle not to exceed 8,500 francs. Among the tests will be a run of 510 kiloms, starting from Paris, doing 75 kiloms. per day until the full distance is accomplished. Only cars built in France may compete, and any competitor may send in as many cars as he likes, both steam and internal combustion engines being admitted. The total weight, ready for the road, is to be 3,400 kilogs., of which 1,600 kilogs. is to be useful load. The motors are to develop at least 12 h. p., at a maximum speed of 1,000 revs. per minute. In the case of explosion motors, a governor and accelerator are to be fitted, and electric ignition is to be a *sine qua non*, while at least three speeds, together with a "reverse," are to be provided. The speeds attained with full load on the flat on macadam roads are to be 3½ kiloms., 4½ kiloms. up to 16 to 18 kiloms. per hour. Transmission to be either by chains or by propeller shafts with cardan joints. Steering is to be irreversible, and at least three brakes are to be provided, of which two are to be on the rear wheels and must be double-acting. Either iron or rubber tires may be employed, and the tanks must provide for a non-stop run of at least 75 kiloms. The frames are to be of pressed steel, armored wood, or of the "blindè" type, and the lowest point of the axles is to be at least 12½ centimeters off the ground. The bodies are to resemble, as closely as possible, the military forage wagons, examples of which may be inspected by those desirous of competing. The attention of the jury will be directed to the following points: 1. Simplicity and accessibility to the various parts (13 marks). 2. Effectiveness of cooling, or the condensing arrangements (5 marks). 3. Consumption of fuel and lubricants (15 marks). 4. Satisfactory working of the different parts (15 marks). 5. Resistance of wheels and tires (15 marks). 6. Efficiency of brakes (10 marks). 7. Controlability of vehicle (5 marks). 8. Starting and hill-climbing (8 marks). 9. Ratio of useful load to total weight (5 marks). 10. Average speed (3 marks). 11. Price (6 marks). Manufacturrers are to give an absolute guarantee for one year with the vehicles that may be selected for purchase.

Accidents in France.

A report on traffic accidents in France has recently been made by M. Hennequin to the Extra-Parliamentary Commission on Automobile Traffic. All accidents are grouped under three distinct heads, according to where they occurred, viz., in urban districts, villages or in the free country. The victims were also classified as drivers, passengers, or outsiders. The inquest extended for a month and a half, from Sept. 1 to Oct. 15, 1903. The number of accidents reported during this period for the whole of France amounted to 3,155, of which 575 occurred in the department of Seine. The report only considers the 2,580 accidents which took place in the Provinces, and of these 753 occurred in urban districts, 743 in villages, and 1,094 in the free country. At first sight it seems astonishing that more accidents should occur in the free country than in towns and villages, but their great number undoubtedly is due to three causes—high speed, disregard of regulations, and negligence or unfitness of drivers. The accidents are reported as due either to horse drawn vehicles, mechanically propelled vehicles and horse riders. Horse vehicles caused 1,325 accidents; mechanical vehicles 1,194, and riders 61. The accidents caused by motor vehicles are further classified as follows: Automobiles, 241; motor bicycles, 131; bicycles, 673; street cars, 149.

According to the Milan Chamber of Commerce *Bulletin*, there are 1,870 automobiles in Italy at present. Most of these cars have been imported from France, which supplied 146 cars in 1900, 248 in 1901, and 252 in 1902.

The following entries have been received for the automobile race meet at the Empire City track next Saturday, under the auspices of the American Automobile Association: Hollender & Tangeman (Fiat), H. S. Harkness (Mercedes), Nathaniel Huggins (Decauville), Sydney S. Bowman (Clement), Peter Fogarty (Northern), Homan & Schulz Co. (Jeffrey), A. G. Vanderbilt (Daimler), Orlando F. Weber (Pope-Toledo), W. G. Brokaw (Renault), Joseph Cowan (Panhard), Oscar Lewisohn (Daimler), E. N. Dickerson (Duryea), Franklin Mfg. Co. (Franklin), H. E. Rogers (Peerless), Guy Vaughn (Decauville), A. E. Harrison (Peerless).

Mt. Washington Hill Climbing Contest.

The hill climbing contest for automobiles to the top of Mt. Washington, N. H., started on Monday morning last at an early hour. The previous record for the climb was broken no less than five times during the day and a new record was established by F. E. Stanley, of Newton, Mass., viz., 31 m. 45 s. The course is about 8 miles long and comprises gradients as steep as 20 per cent. The contest began at 5 o'clock in the morning, and the first to make the ascent was L. J. Phelps with a 20 h. p. Phelps touring car, who required 2 h. 7 m. 8 3-5 s. to reach the summit. W. B. Jameson, with an Orient buckboard of 6 h. p., left at six o'clock, and made a time of 2 h. 9 m. 36 4-5 s. Benjamin Smith, in an Oldsmobile, covered the course in 1 h. 25 m. 14 1-5 s. Webb Jay, driving a White steamer, punctured a tire and retired, but will make another trial later. Alexander Winton competed with a 20 h. p. Winton touring car, and made a time of 1 h. 35 m., but would have done better if his engine had not stalled part way up. James L. Breese, with a 40 h. p. Mercedes, made the next best time to Mr. Stanley, viz., 34 m. 9 4-5 s. The previous record, recently made by Otto Nestman in a Stevens-Duryea, was also broken by H. Ernest Rodgers, 24 h. p. Peerless, in 48 m. 7 2-5 s.; Percy Pierce, 24 h. p. Pierce-Arrow, in 44 m. 31 4-5 s., and A. E. Morrison, Peerless, in 36 m. 44 1-5 s. The weather during the day was rather warm, but a number of showers in the afternoon slightly lowered the temperature.

Conclusion of Motor Cycle Endurance Tests.

About 75 motor cyclists started on the two days' run of the Federation of American Motor Cyclists to Cambridge, Md., last week and all returned to the headquarters in West Sixtieth street, New York, last Sunday night. The trip was without serious mishap. At the convention in Cambridge it was decided that the organization should control all motor cycle racing on track and road after January first next, and notice to this effect was forwarded to the National Cycling Association in this city. The following officers of the federation were elected: R. C. Betts, New York, president; Herbert L. Marsh, Hackensack, N. J., H. A. French, Baltimore, Md., and L. H. Hill, San Francisco, Cal., vice-presidents; Henry J. Wehman, Brooklyn, N. Y., secretary; Dr. G. B. Gibson, Westborough, Mass., treasurer. A series of races was held in Cambridge last Saturday, in which J. J. Nevin, of this city, won four on a Rambler motor cycle.

From England a new 2,000 mile non-stop run is reported. Like most other recent alleged non-stop runs it was not made under official observation, and is therefore of no value.

IINOR MENTION

reported that John D. Rockefeller ught a double-cylinder Knox touring

y Unwin, formerly secretary of the A. M., has joined the sales depart- f the Olds Motor Works.

Weston-Mott Co., Utica, N. Y., is g an addition to its factory which ive the company double its present y.

s T. Long and Adam Ertter have ed an automobile transportation y to carry passengers over the Get- battlefield.

. Olds, who has been conducting an bile agency in Washington, D. C., is aveling for the agency department of ls Motor Works.

on McGregor, manager of the Walk- Wagon Co., Detroit, is said to be ed in the organization of a company ufacture automobiles.

American Atuomobile Association ed a circular containing the deed of rtaining to the challenge cup given . K. Vanderbilt, Jr.

rse and carriage concern in Bridge- onn., in an advertisement in a local makes use of an automobile cut— y a sign of the times.

law requiring the registration of au- les with State authorities became e in Iowa on July 4. Over 500 cars lready been registered.

Pope Manufacturing Co. announce y will manufacture gasoline delivery at their Crescent works in Chicago ir Westfield (Mass.) factory.

July meeting of the N. A. A. M., ed for last Wednesday, was aban- wing to the lack of a quorum. The eeting will be held on August 3.

John, a Sioux Indian, created a sen- mong his people recently by appear- n automobile, which he purchased in for $2,000, according to a report.

as B. Jeffery & Co., Chicago, have leased the store at 302 Wabash that city, and are believed to have e of the largest automobile reposi- n the Western metropolis.

Marguerite Walsh, of Denver, Col., of Thomas Walsh, a wealthy Colo- iner, sustained severe injuries by the n of a gasoline tank of an auto- presented to her by her uncle.

Bascom & Smith have established an automobile storage and repair business at 129 Michigan avenue, Lansing, Mich. They have become agents for the Orient buckboard and the Pierce-Racine touring car.

A number of automobile owners of Lancaster County, Pa., have united to form an organization for the purpose of fighting in court the claims of the turnpike companies that they can collect tolls from automobiles.

The Star Auto Co., New York agents for Crest cars, have established offices at 144 West Thirty-ninth street. F. P. Johnson is manager of the company and associated with him is F. G. Dwight, Jr., formerly with the Winton and Cadillac companies.

At a meeting of the New York Automobile Trade Association last week, the Worthington Automobile Co., the Broadway Automobile Exchange, and James McIntosh, who conducts a garage, were admitted to membership, bringing the total to 29.

Steps have been taken for the formation of an automobile club in Lynn, Mass. There are nearly 300 automobile owners in Lynn, nearly all of whom are expected to join. Thomas W. Gardiner and Walter S. Haliburton are in charge of the preliminaries.

A trackless trolley service is contemplated by the Schenectady Railway between Cohoes and Albany. It is proposed to operate the cars by overhead wires, without tracks or rails. Storage batteries will be provided to furnish power where there are no overhead wires.

The capital stock of the Standard Roller Bearing Co., Philadelphia, has been increased from $1,000,000 to $2,000,000, and a 250 feet addition to the machine shop and factory, one measuring 50 by 125 feet to the ball plant, and a two story office building are to be erected. The new structures will be ready early next October.

Jacob Roth, who is employed in an automobile repair shop at Ninth and South streets, Philadelphia, was arrested last week, charged with using the automobile of Dr. M. J. Heider, of 1433 South Sixth street, Philadelphia, without his consent. On the trip a tire burst, and the repair man had to return in a street car.

Sir Ralph Gore and A. D. Grigg, members of the Automobile Club of Great Britain and Ireland, arrived in New York last Monday on the steamship Minneapolis. The former has a 40 h.p. Mercedes and the latter a 22 h.p. Daimler, and it is their intention to make the run to St. Louis. They will probably be asked to join the A. A. A. tour to that city.

The protest filed by R. M. Owen, of New York, against the competition of the Stevens-Duryea racer in an event for stock cars in the Eagle Rock hill climbing contest last fall has just been decided in his favor, and the first prize, a gold medal, has been awarded to Mr. Owen's Franklin car, which made the ascent in 3:21½ m.

The Superintendent of Parks in Rochester, N. Y., has had posts placed on the road in front of Genesee Valley Park, by means of which automobilists may readily determine their speed. The posts are 352 feet apart, and a table indicates the rate of speed by the time it takes to go from one post to another. Similar posts are to be put up in Seneca Park.

The automobilists and horse owners of Wheeling, W. Va., have found a common ground for co-operation in the good roads movement, and plans have been formed for a joint organization. The movement is the result of the recently formed Wheeling Automobile Association. The new club will probably become affiliated with the national good roads organization.

A reorganization of the National Capital Automobile Co. has been effected under the name of the National Automobile Co. A capital stock of $20,000 is said to have been paid in. Quarters have been established on Fourteenth street, between R and S streets. The officers of the new company are: E. C. Graham, president; H. B. Mirick, vice-president and treasurer; E. P. Mussbaum, secretary.

E. B. Meyrowitz, of 104 East Twenty-third street, New York, is offering a new style of automobile goggle, similar to his Nostare pattern, but at a lower price, which he has christened the "Autoclub." The new goggle has aluminum cups of unusually large size permitting the wearing of eyeglasses or spectacles at the same time. The close contact with the face provides adequate protection from wind and dust.

At the directors' meeting of the A. A. A. last Wednesday, the Empire City Trotting Club and 20 individuals in various parts of the country were admitted to membership. Sanction for the following race meets was authorized: Empire City Trotting Club, Yonkers, July 16; Cleveland Automobile Club, August 19-20; Dutchess County Agricultural Society, Poughkeepsie, N. Y., September 16. The next directors' meeting will be held September 6.

The E. R. Thomas Motor Co. believe that the policy of secrecy about construction methods is waning in the automobile industry. The company last summer sent some of its foremen to the leading factories, and they were invariably cordially welcomed, while this summer the Thomas works have been opened to manufacturing representatives from England, Japan and China, technical students from Columbia and Cornell Universities and recently to ten foremen from the National Cash Register Company's works.

Legislative and Legal.

The Brooke county (W. Va.) court has prohibited the operation of automobiles on the public roads of the county, "as a detriment to the use of the roads for legitimate purposes and a danger to the traveling public."

The Chicago Motor Vehicle Co. has filed in the United States District Court, Chicago, an answer to the petition of E. A. Potter, receiver, who had asked, on behalf of the creditors, to have the property of the company sold to the highest bidder. The answer states that the company is solvent, the indebtedness being $211,000, while the plant and assets are worth at least $500,000.

Club Notes.

DALLAS A. C.

At a recent meeting of the club steps were taken to incorporate the organization. S. O. Murray was elected treasurer to succeed J. D. Schofield, resigned.

A. C. OF WAYNE COUNTY.

Thirteen members of the Automobile Club of Wayne County, Ind., and their guests indulged in an enjoyable run from Richmond to Fountain City on July 1.

BROCKTON (MASS.) A. C.

The club held a parade one day last week in which 44 cars of all descriptions took part. The arrangements were in charge of Dr. F. E. Constans, the club's president. The parade formed on Warren avenue, Highland street and High street and started at six o'clock.

A. C. A.

During the remainder of the month of July and the month of August, the clubhouse will be closed each evening at 7 o'clock. On the occasion of the Empire City track race on July 16, house privileges of the Empire City Trotting Club will be extended to members.

A. C. OF S. C. AND C. A. C.

Arrangements have been practically completed by the Automobile Club of Southern California and the California Automobile Club for the trip from San Francisco to Los Angeles and return late this month. A programme of races has been planned at Los Angeles, a feature of which will be a contest between physicians.

FLORIDA EAST COAST A. A.

The new clubhouse of the Florida East Coast Automobile Association on the Ormond-Daytona beach was opened on the Fourth, with appropriate ceremonies. C. G. Burgoyne, president of the association, who spends the greater part of the year at Ormond, officiated. The doors of the clubhouse bear in 18-inch figures the record of a mile in 39 seconds, made over the Ormond-Daytona course by W. K. Vanderbilt, Jr.

A. C. OF PITTSBURG.

The hill-climbing contest of the Automobile Club of Pittsburg, on July 2, was participated in by 43 vehicles, divided into eight classes, six according to the horse power of the machine and the other two reserved for members of the club and for dealers and manufacturers. The contest was over a grade averaging 17 per cent. about one-third of a mile long. Among the winners were: John A. Pietsch, in a Stevens-Duryea; W. L. Dixon, in a Peerless; F. C. Fownes, in a Pope-Toledo; the Standard Auto Car Co., in a Pope-Toledo.

The Dayton Races.

The Dayton (O.) Automobile Club held a race meet at the Fair grounds track in that city on July 4. The event was of a somewhat novel character, a sort of automobile field day. In the forenoon there were demonstrations of different kinds, at noon an outdoor dinner was served under the big shade trees of the grounds and in the afternoon the races came off. A number of the best-known track racers were present, including Barney Oldfield, Carl Fisher, Earl Kiser and J. J. Winchester. A number of the events on the programme had to be cancelled for lack of entries, but the meet proved, nevertheless, fairly successful. Summary.

Three miles, stock cars, stripped; J. D. Platt, Jr. (Franklin), first; C. C. Rooney (Marr), second; C. B. Wolf (Haynes-Apperson), third. Time, 5:03.

Special match race: J. J. Winchester (Franklin), first; Earl Kiser (Olds Pirate), second. No time given.

Five miles, open: J. J. Winchester (Franklin), first; Earl Kiser (Pope-Toledo), second; Barney Oldfield (Peerless), third; J. D. Platt, Jr. (Franklin), fourth. Time, 7:27 1-5.

Special match race: Carl Fisher (Comet), first; J. J. Winchester (Franklin), second. No time given.

Stock cars, stripped, loaded three miles: A. M. Dodds (Franklin), first; H. M. Carl (Franklin), second; Harry Cappel (Cadillac), third. Time, 5:16 2-5.

Heavy touring cars, three miles: Carl Fisher (Pope-Toledo), first; Pierce Schenck (Winton), second; Barney Oldfield (Peerless), third; C. C. Rooney (White), fourth. Time, 5:43 2-5.

Stop and start, light touring, loaded, three miles: H. M. Carr (Franklin), first; Dodds (Franklin), second. Time, 7:15.

Special, two miles against time: Carl Fisher (Premier-Comet). Time, 2:40.

Special touring cars, three miles: Emil Koeb, Springfield, first; C. B. Wolf, Dayton, second; Adolph Euchenhofer, Dayton, third. No time given.

Stop and start, three miles, heavy touring, loaded: Carl Fisher (Pope-Toledo), first; C. B. Wolf (Hayes-Apperson), second; Adolph Euchenhofer (Stearns), third Time, 8:12 3-5.

Light touring cars, three miles: H. L. Carr (Franklin), first; A. M. Dodds (Franklin), second; J. J. Gardner, Middletown, third. Time, 5:46.

Pursuit race, 5½ miles: Carl Fisher, first; J. D. Platt, second. Time, 7:32.

Patents.

261,384. Friction Gearing.—John W. Lambert, of Anderson, Ind. May 31, 1904. Filed July 19, 1902.

The invention relates to a friction disk drive for automobiles. The main or driving disk is faced with a disk of aluminum, fastened by means of screws located outside the working surface. The driven disk has a working rim of elastic fiber, either paper or wood. The inventor says: "In practice I have found that this combination of aluminum and fiber bearing surfaces gives the maximum degree of friction and durability, thereby especially adapting the gearing for use on motor vehicles of the heavier kind, where the friction surfaces are at times subjected to great strains, and must, therefore, have a frictional contact of a high degree of efficiency in order to avoid slipping. It will be observed that the aluminum is advantageous also, because it will not tarnish or rust appreciably, but will always present a smooth, clean surface to the fiber periphery, so that wear will be reduced to a minimum."

763,477. Transmission-Gear. Frank G. Gies, Detroit, Mich. June 28, 1904. Filed Dec. 18, 1902.

763,548. Two-Speed Reversing-Gear. Frank A. Ferguson, Blanchard, Iowa. June 28, 1904. Filed Aug. 21, 1903.

763,565. Secondary Battery. Jacob W. Madigin, Toronto, Canada. June 28, 1904. Filed Jan. 10, 1903.

763,602. Convertible Tourist and Automobile Cap. Robert Fox, New Rochelle, N. Y. June 28, 1904. Filed April 1, 1904.

763,626. Exhaust-Muffler for Explosive-Engines. Dore Ogden, Columbus, Ind. June 28, 1904. Filed July 13, 1903.

762,138. Road Motor Vehicle. William E. Carmont, Kingston-on-Thames, England. June 7, 1904. Filed Dec. 22, 1903.

762,156. Sprocket Gearing. James M. Dodge. Philadelphia, Pa. June 7, 1904. Filed Feb. 4, 1903.

762,501. Pneumatic Tire.—Georges Steinberg, of Paris, France. June 14, 1904. Filed April 1, 1903.

762,197. Steering Apparatus for Motor Vehicles.—L. R. Rogers, of Worcester, Mass. June 7, 1904. Filed April 20, 1903.

762,707. Carburetor for Internal Combustion Engines.—Joseph Grove, of Birmingham, England. June 14, 1904. Filed October 31, 1903.

761,927. Cooling Device for Explosive Engine Cylinders.—C. E. Van Norman, of Springfield, Mass. June 7, 1904. Filed August 13, 1903.

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THE HORSELESS AGE

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The Carburetor Problem.

Of the many carburetors now offered in the market, it appears that few, if any, have met with universal success. This is probably due partly to differences in the design of the engines to which they are applied and partly to an attempt to make one size of carburetor do for too big a range in size of engines. A number of carburetors are reported to have proven more successful on air-cooled engines than on water-cooled, which would seem to indicate that with these the vaporization of the gasoline must be completed by the heat of the cylinder and is therefore effected more thoroughly in an air-cooled engine, with its hotter walls. In carburetors for air-cooled engines it has also been found desirable to provide a two-way valve which, when coasting, can be set to admit nothing but pure air to the cylinder. After a hard climb, it is usually advisable to allow the engine to cool, and this may be accomplished by "shutting down" the engine, either by interrupting the spark and simply pumping the mixture through the cylinder or by shutting off the mixture and admitting only fresh air. The latter alternative is preferable, as it saves gasoline, tends to clean the cylinder walls and prevents explosions in the muffler when the engine is started up again. An air valve of this kind would seem to be advantageous also on a carburetor for water-cooled motors.

An important point is the method of feeding the gasoline to the carburetor. The almost universal custom is to feed it by gravity from a supply tank located at the highest available point, in the front seat, to the carburetor, which is located as low as possible, usually at the side of the engine crank case. Although this method is undoubtedly the simplest, it has several inherent disadvantages. The carburetor being located so low, is more likely to be affected by the dust and mud of the road; with a vertical engine the intake pipe must be quite long, which in cold weather is liable to give trouble from recondensation, and, finally, in case of a bad leak in the gasoline pipe to the carburetor, all the contents of the supply tank may be emptied out. These objections, with the exception of the last, are overcome by feeding the gasoline by gas pressure from a tank located under the frame at the rear part of the car, but this system introduces complications that would hardly be tolerated in a small car.

A system that offers many advantages, both as regards convenience and safety, is employed on an American car recently brought out. It is similar to the safety gasoline feed systems much used on steam cars in recent years, in that two tanks are used, the one from which the carburetor is supplied directly being of small capacity, and being refilled from time to time from the main tank by the driver, by means of a few strokes of a conveniently located hand pump. The small tank can be located high up in the bonnet and there are then almost no restrictions on the location of the carburetor.

The Mount Washington Hill Climbing Contest.

A fair degree of success seems to have been attained by the hill-climbing contest up Mount Washington, in New Hampshire, reported in another part of this issue. The number of contestants must be regarded as quite large, considering the locality, and the event was given considerable attention in the public press, chiefly, no doubt, owing to the phenomenal times made, as compared with the former records, by a number of the high-powered machines. That particular part of the country has never

witnessed an automobile competition before, and autos are still rather rare there, yet the natives seem to have taken but little interest in the event, except the concluding part—the tour. The spectators during the hill climb consisted almost entirely of newspaper men, photographers and a few auto enthusiasts. The popularity of the locality ought to have served as an attraction, but the distance from the large cities is strong objection to the place for an automobile contest, and most likely the local hotel men consider the event not so big a success as they had expected.

The performance of the light, medium-powered cars, creditable as it may be, is unfortunately always over-shadowed in these events by that of the big monsters. In the regulations a commendable effort was made to give cars of all classes a fair chance by providing a large number of classes, based upon prices, but the daily press finds little of interest in the achievements of any but the fastest and most powerful machines.

Of far greater value than the performance of the big touring cars, which generally leave little to be desired in point of hill-climbing ability, are the results achieved by the small machines. To ascend a continuous grade between seven and eight miles long, with some pitches as steep as twenty per cent., in times varying between an hour and a half and a little over two hours, is a very creditable performance, and much better than anything possible with this class of machine until quite recently. Such a long climb is a particularly severe test of the engine, cooling system and change speed gear, especially if the planetary system is used, and the results indicate substantial recent improvements in these parts.

Protect Dangerous Crossings!

Another crossing accident, in which three persons were killed, occurred on Wednesday last week on the Merrick road, Long Island, at an unprotected and hidden crossing of the Long Island R. R. The installation of gates at the more dangerous crossings and the eventual construction of underground passageways, are now being advocated by a number of daily papers in this city, and the A. C. A. has adopted resolutions urging the city government to effect these improvements. It may be pointed out here that the automobile and touring interests in France have conducted a several years' campaign to have all the more dangerous railroad crossings carried underground, and evidently with success, for, as reported in one of our recent issues, the Department of the Seine (Paris) recently voted a sum of one and a half million francs to carry out these improvements.

Danger of Tire Bursts.

A number of recent serious accidents abroad having been reported in the public press as due to the bursting of tires, one of our French contemporaries has made an inquiry among prominent automobile men as to whether the bursting of a cover actually involves any serious danger to the occupants or not. From the replies it appears that generally when an accident is reported to have been caused by a tire burst, the latter is only the result of the real cause, violent skidding, for instance, or an ill-judged move of the operator. It is admitted that if a tire goes flat on a turn made at high speed, it may prove the cause of a serious accident, but, at the same time, in the majority of cases when cars overturn at curves and a tire is found torn, it is most probable that the damage was sustained in the smash-up, and was not the cause thereof. The bursting of a rear tire on a straight course has practically no effect on a car equipped with a substantial back-lock steering gear; the differential gear compensates for the difference in effective diameter of the two driving wheels, and there is very little tendency for the car to deflect from its straight ahead direction, only a slight increase in the jolting and in the noise made. Such accidents have happened at very high speeds without serious consequences. M. Serpollet, for instance, relates that in testing out one of his Paris-Berlin racers he lost one of his driving wheel tires during a run at full speed, and never noticed that anything was wrong until he slowed up, when the peculiar whistling noise observed at high speed persisted. The rim was polished by the road friction, showing that the tire had been off for quite a while.

The bursting of a front tire is a more serious matter, and is generally felt instantly. Yet a competent, collected driver will have little trouble in retaining control over his car in such a case, provided, always, the steering gear is reliable. It has been observed, however, that nervous drivers are likely to lose their presence of mind momentarily in case of a tire burst, and that the vehicle may consequently be practically left to itself, so to speak, for a moment, which may cause an accident if the speed is high and other conditions are favorable. There is, of course, much danger in a tire burst at high speed on a car without back lock steering, and such cars should therefore never be driven very fast. Back lock gears are now provided on all high powered cars.

The conclusion drawn from the discussion by our contemporary is that there need be no danger from tire bursts if ordinary precautions are observed in driving; that is, if the tires are regularly inspected, and discarded when defective; if turns are made at a moderate speed; if the steering wheel is always held firmly and wrapped with fine cord if the rim is slippery, and if the brakes are applied slowly in case a tire explodes.

Bad Roads in the Middle West.

As the tour to St. Louis starts in about a week, the present condition of the roads along the different routes is a subject of considerable interest. Heavy rains are reported throughout the Eastern and Central States during the past month, and in consequence the roads are generally very muddy. Quite a number of automobile tourists who have already arrived in St. Louis from different parts of the country report roads deep with mud. A party from Kansas City started in a rain which pursued them until they arrived at the World's Fair city, after a seven days trip. They had calculated on making the run in four days. In many places the roads were flooded, and more than once farmers' mules had to be pressed into service to extricate the machine from mud holes.

Iu Ohio and Illinois the roads are in about the same condition. A party from Washington, D. C., bound for St. Louis, by way of Cleveland and Columbus, pronounced the roads in Ohio the worst they had ever seen. They also complained of the heavy toll rates that had been charged them in the State, an average of $1.50 per day. To complete their troubles, the car was robbed several times at wayside hotels. Another automobilist, who recently completed the trip from Baltimore to St. Louis, found the roads in the worst condition in Illinois, the wheels at times sinking into

l. up to the axles, and horses being . to draw the car out of the mire. ›urse, at this time of the year, if ıs should cease, the roads would dry up and could readily be put condition by a little scraping. But, nately, this is also the busy season ıe farmers, and road repairing is › be neglected. There is little doubt the rains continue as at present, they se havoc with the entries for the ›ur. In such an emergency all that can will be well advised to choose tional Road route, as the National ith its solid stone foundation is . by wet weather much less than the y dirt road.

California Endurance Contest.

s are being perfected for an endurontest between San Francisco and igeles in the near future. The route l comprises 506¾ miles of every posariety of road and scenery. A large ı of the course is along the coast, e grades necessary to overcome are p as thirty per cent. There will be ight stop stations along the course; Santa Barbara, another at San Luis , and a third at Salinas. The speed : limited to an average of 15 miles ır, and operators will be penalized a ı number of points for coming into ations ahead of time. An observer : in each car, and it will be his duty e note of all infringements of the ınd of stops other than provided for e regulations. The committee in : of the contest will make an effort to age the participation of women as gers, and to make it as much of an as possible. The San Francisco conts will start first, and will go to Los es in the estimated time of four days will be allowed one day of rest there, ıen, in company with the Los Angeles will start on the return trip. The enos will finish five days later than hers. The run will be under the imte direction of the automobile clubs : two cities. The date of the contest ot been determined, but it will probbe in the latter part of this month. Lowe, of San Francisco, recently went the proposed route, and while in Los es conferred with the officials of the nobile Club there regarding the arments for the run.

ry one of our German contemporaries it as its opinion that though the Merracers lost the Gordon Bennett race, ıre still unexcelled. One may well hat is the use holding the race at all oes not carry conviction.

Spark Plugs—I.

By Albert L. Clough.

The almost universal adoption of the jump spark method to the ignition of automobile motors has raised the spark plug to a position of great importance and consideration in the automobile world and has led to the expenditure of a vast amount of time and thought upon the perfection of this small but supremely important adjunct of motor car operation.

PRINCIPAL PARTS.

In its essential features, the pump spark plug is a device of extreme simplicity, consisting of but three necessary parts, namely: A metal shell capable of insertion into the combustion chamber of the motor, a hollow bushing of insulating material adapted to fit the metal shell internally, and a metal spindle adapted to fit the hole in the insulating bushing and provided with a discharge terminal upon its inside end and means for clamping the lead wire upon its other extremity. These three portions, together with accessory parts designed to fasten the construction together and to render it gas tight, form all the constituent parts of any jump spark plug, but the variations, in material employed, in the form and arrangement of the parts and in the method of manufacture afford an almost endless variety and furnish an interesting study to one who cares for automobile details.

CONSTRUCTION OF METAL PARTS.

The construction of the outer shell and of the inner spindle is not a matter of particular interest or moment, the shell being manufactured of iron along practically the same lines as ordinary pipe fittings are produced, while the spindle or electrically alive portion is usually of brass or steel rod bearing the live discharge terminal on one end and a thread for the connecting screw on the other. It is, however, upon the material and form of the insulating bushing that the ingenuity of the spark plug designer is mostly lavished.

Upon the integrity as a non-conductor of the insulating bushing, absolutely depends the operation of the plug, and a minute crack in the material of the bushing is sufficient to allow an escape of the current through it, instead of between the sparking points, and cause a cessation of the ignition.

CAUSES OF INSULATION FAILURE.

Failure of the insulation usually takes place from one of the three following causes: The insulation becomes covered with a conducting coating which allows the current to escape quietly over the surface of the bushing from the spindle to the shell. The bushing may break, allowing the current to discharge through the crack, or the insulation may become impregnated with conducting matter, rendering it of doubtful quality as a dielectric and allowing of an escape of current through the material of the bushing.

A great deal of effort has been expended in attempts to minimize the liability of one of these accidents happening. Breakage of the bushing seems to occur either from some mechanical shock or from internal stresses occasioned by a difference of temperature existing between different parts of the insulating tube—the inner end, in the combustion chamber, being very hot and the outer end, in the open air, being comparatively cool. The more brittle the insulating material may be, the more danger there is of the insulation becoming cracked. Porcelain is particularly prone to failure by cracking, although the imported quality, which is especially employed for spark plug bushings, is exceedingly fine grained, hard and mechanically resistant. In order to minimize the danger of cracking from unequal heating, the bushing is sometimes made sectional, so that the portions inside and outside of the cylinders may expand independently. In order that plugs which make use of porcelain insulation may be capable of being repaired after the porcelain is cracked, they are generally arranged so as to be readily refitted with new bushings. Spark plug blushings built up of mica are from the nature of the material quite free from the liability of becoming cracked from blows or from unequal expansion by heat.

SOOTING OF INSULATOR SURFACE.

Prevention of the failure of spark plugs due to a conducting surface being formed over the insulating material, has proved a problem of great importance and difficulty. If an explosive mixture is employed in the cylinders which contains an excess of gasoline vapor, there must necessarily be some gasoline each stroke which is not perfectly consumed. The result of the imperfect combustion of a hydrocarbon is the freeing of carbon in the form of lampblack, and some of this minutely divided and conducting material deposits upon the insulating surfaces and allows of the passage of a "sneak" current, which prevents the disruptive discharge at the plug terminals. Then, too, if an excess of lubricating oil is employed in the cylinder, some of it is sure to splash upon the end of the spark plug, and as the temperature of the plug is likely to be higher than the decomposing point of the lubricant, a carbon deposit will result.

The extreme heat to which the spark plug end is exposed is likely to ultimately deteriorate the end surface of the insulation. Porcelain loses its glaze after considerable service and presents a rough surface, generally of a slightly pinkish or yellowish hue. This unglazed surface seems to catch the carbon deposit more readily and is not easily cleaned.

PREVENTION OF SOOTING.

Many expedients are in vogue intended to prevent this carbon deposit or to mini-

mize its effect, and it seems rather strange that so much effort is directed toward this end when it is perfctly practicable to remove the cause of sooting, and far more effective than treating the symptom after it has manifested itself. A perfect mixture will not deposit a particle of soot upon any kind of spark plug, and a plug may be run almost indefinitely without fouling in a cylinder having a proper quality of gas and judicious lubrication. If one-half the attention which is paid to the manufacture and use of non-sooting plugs were expended upon carburetor adjustments and oil feeds, a better condition would probably be the result. Of course, if a bad mixture has to be used, soot proof plugs are valuable in so far as they deserve this designation, and even the use of an auxiliary spark gap to render the "soot proof plug" operative if it should finally become fouled, might be warranted, but "removing the cause" is the only truly logical course under such circumstances.

THEORY OF ANTI-SOOTING PLUGS.

The methods by which the insulation of plugs is claimed to be prevented from fouling are based upon theories, some of which are very difficult of demonstration and are regarded with more or less skepticism by those who have given thought to the matter. The most common construction designed to effect this end is the use of a cavity between the outer shell and the inner spindle, that is, the bushing is arranged so as not nearly to fill this space, which may extend quite deeply into the sparking end of the plug. The line terminal is arranged at the mouth of this cavity and may be a point brought into juxtaposition with the outside shell, or it may be a round plate, nearly filling the mouth of this chamber. The insulating bushing is generally not brought out flush with the sparking terminals, and is thus protected to a certain extent from splashing oil. It is claimed that during the compression stroke a small portion of the working charge is forced into the cavity above described, and that when the spark is produced this part of the mixture is first ignited and expands, rushing out of the enclosed space so violently as to preclude the possibility of any carbon deposit taking place. Another theory of the protected terminal or explosion-chamber plug is that the gases which are in the base of the cavity of the plug very seldom change, are practically inert and non-explosive, while the gas at the tip of the plug is fresh and easily ignited, and, as the dead gas which envelops the end of the insulating bushing, at the bottom of the cavity, does not burn, it can deposit no carbon, and thus the end of the bushing remains clean.

AIR CUSHION PROTECTION OF INSULATOR.

Another form of plug which makes use of a concentric chamber between the shell and the spindle with the insulating bushing terminating near the bottom of the cavity, possesses alleged soot-proof qualities based upon a novel principle. There are two small, inwardly opening check valves incorporated into the plug, and communicating with the outside air. These air inlets deliver their air close to the end of the porcelain bushing which forms the insulating surface. The theory of operation of this plug is, that during the suction stroke of the engine a small quantity of pure air is drawn in through the check valves and forms an inert and clean covering for the bushing. The gas about the end of the insulation is claimed not to take any share in the explosion and thus can make no deposit upon the surfaces with which it is in contact.

Until we know more about the behavior of the gases inside an internal combustion motor, we may not be in a position to state with assurance just how the so-called non-sooting plug performs its function, but it is hardly to be doubted that there is some advantage in a plug having a free space between the shell and the spindle with the insulation somewhat withdrawn into this chamber.

MINIMIZING SURFACE LEAKAGE.

The leakage effect due to sooting is reduced in many forms of plugs, by the expedient of increasing the superficial extent to the insulating material which intervenes between the shell and spindle. This forces the leakage current to travel over a greater length of carbon film, and materially reduces the loss of energy due to this cause. By forming the end of the insulation with deep corrugations concentric with the spindle, the sneak current is constrained to follow a circuitous path and is much reduced. Most plugs now manufactured seem to embody in the form of the bushing end the idea of increasing the path of escape of the sneak current. Plugs used to be constructed with the bushing end perfectly flat and interposing the minimum superficial distance between the shell and the spindle, but one sees very little of this construction at present.

Spark plug bushings sometimes fail in their insulating properties through becoming impregnated with carbon-containing material. When this occurs the bushing becomes unreliable electrically and sometimes the defect is very difficult to locate. Porcelain, so long as it retains its glaze, is practically free from this absorbent quality, the deposit upon it being entirely superficial and easily wiped off. Lava, which is an unglazed stone, is somewhat absorbent, although not seriously so.

MICA INSULATION.

The mica bushings which are used for spark plug insulation are generally built up of washers cut out of sheet mica and assembled upon the spindle, which generally has previously been given a wrapping of sheet mica. As it is not considered good practice to use a cement for the purpose of binding these washers together to form the bushing, the pressure produced by the parts of the plug themselves is relied upon to consolidate the mica sheets into a solid body. It is claimed, however, by those who are averse to the use of this material, that oil works in between the laminae of the mica, and is carbonized by the heat; also that the carbon deposit from a bad mixture is not entirely superficial and cannot be completely wiped off. They claim that the electrical defects which develop in mica bushings are insidious and difficult of detection, while those arising in the use of porcelain are obvious and readily located. However, mica appears, on the whole, to be gaining in public favor somewhat at the expense of its rival, porcelain.

GAS-TIGHT JOINTS.

The joint between the shell and the porcelain bushing is generally made gas tight by means of an asbestos washer which is forced between an external shoulder on the bushing and an engaging internal one on the shell. When a mica bushing is used for insulation, it may be formed on a taper and the shell may be formed in a corresponding conical shape internally so that the two parts make a perfect joint when forced together. The joint between the spindle and the bushing is sometimes sealed with cement.

SPARK TERMINALS.

As the discharge terminals of spark plugs are subjected to a high degree of heat, they are generally made of some alloy of platinum, although silver, german silver and some special cheap alloys are made use of. The material used is probably a far less important consideration than is generally believed. About the only requirements are that the points shall be of material which shall not oxidize away too rapidly, and that they shall be of ample strength mechanically so as not to be disarranged as regards their sparking distance when the plug is being screwed in place. If the discharge points are too fine or sharp, there may be some diminution of the disruptive character of the spark, due to a brush discharge.

Claims are sometimes made by manufacturers for "low resistance terminals." As a matter of fact, the resistance of the electrodes of the plug would always be negligible in respect to that of the air gap or the coil. There is much more which might be said about spark plugs in general if space permitted. Specific descriptions of some of the plugs upon the market will be given in a later article.

A party of fashionably dressed tourists, presumably a count and countess and a friend, has been crossing the Swiss frontier repeatedly from France. The suspicions of the authorities were at last aroused. The automobile was stopped and searched, and the pseudo count and countess were found to be notorious smugglers. Their fine raiment as well as the automobile were simply loaded with all sorts of dutiable goods.

New Vehicles and Parts

The New Four-Cylinder Winton Touring Car

The Winton Motor Carriage Company have recently begun deliveries of a new four cylinder touring car with side-entrance tonneau body, called for short the "Winton Quad." In bringing out this new design, the aim of the manufacturers has been to meet the popular demand for a more powerful machine, a smoother running engine than a two cylinder can be, and the fashionable and comfortable side-entrance tonneau body; and in embodying these features in the car, they have sought to combine thorough protection of all working parts from dust and mud, with ready accessibility of all those parts which will occasionally need attention on the road or at the stable. While the car presents many novel and improved features of design, several of the distinctive features of the earlier Winton cars have been retained. Thus, the engine is equipped with the Winton system of air pressure control, so modified that it may be governed either by the hand or the foot, and the change speed gear is much the same as that on the 1904 touring car, the changes being practically only such as are required by the use of shaft transmission instead of single-chain transmission. One especially notable feature of the new car is the extensive use of aluminum, in consequence of which, and of refinements in design, the new car is actually lighter than the 1904 touring car model, in spite of a more powerful engine and a longer wheelbase (104 inches).

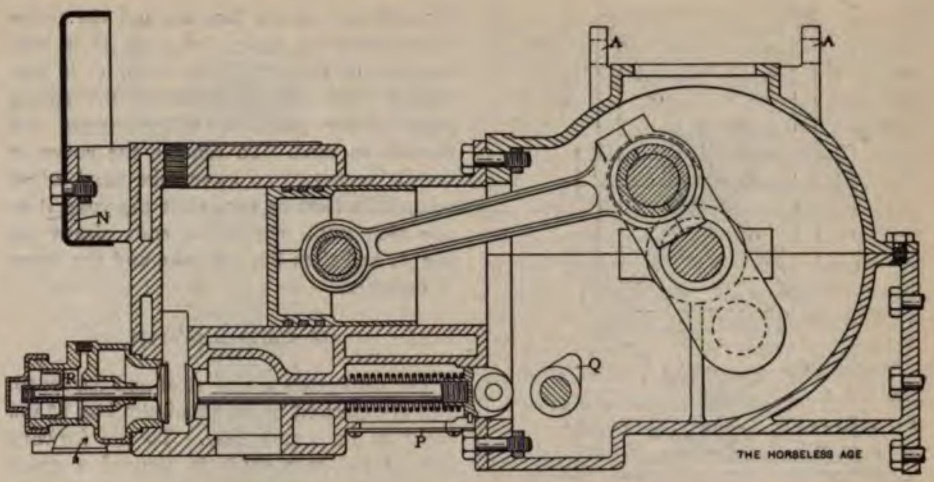


Fig. 2.—Vertical Section Through Engine Cylinder.

THE MOTOR.

The motor is a four cylinder, horizontal one, arranged transversely under the footboard on the right hand side, with the crank shaft parallel with, and slightly to the left of the frame centre line. The cylinders (Fig. 2) are of 4⅜ inches bore and 5 inches stroke, and the engine is rated, rather conservatively, at 24 h.p. The cylinders are cast in pairs, with water jackets and heads integral, the jackets being cast open at the sides and closed with aluminum plates, as in the two-cylinder Winton engine. The inlet and exhaust valves are arranged in line with each other below the cylinders. The inlet valves are automatic, and their opening is controlled by air pressure, while the exhaust valves are operated by cams on a cam shaft running transversely through the lower part of the crank chamber. As in the two-cylinder engine, the exhaust valve stem (which is exceptionally heavy), the valve spring and cam-roller block are entirely enclosed and hidden from view, but an opening is cast in the housing underneath the spring, and is closed by an aluminum plate P which can be readily removed to investigate the condition of the spring.

The crank shaft is a drop forging, and has four throws, the two inner and the two outer pins being in line with each other, respectively. It has two main bearings and one intermediate. The connecting rod is also drop forged, and of I-section. It is provided with bronze bushings at both ends, that at the crank end being split, to provide means of adjustment for wear. It will be noticed from Fig. 2 that the connecting rod head is split at an angle, which makes the nut on the lower of the two studs through the cap more accessible through the hand hole on top of the case. The connecting rod cap is secured to the

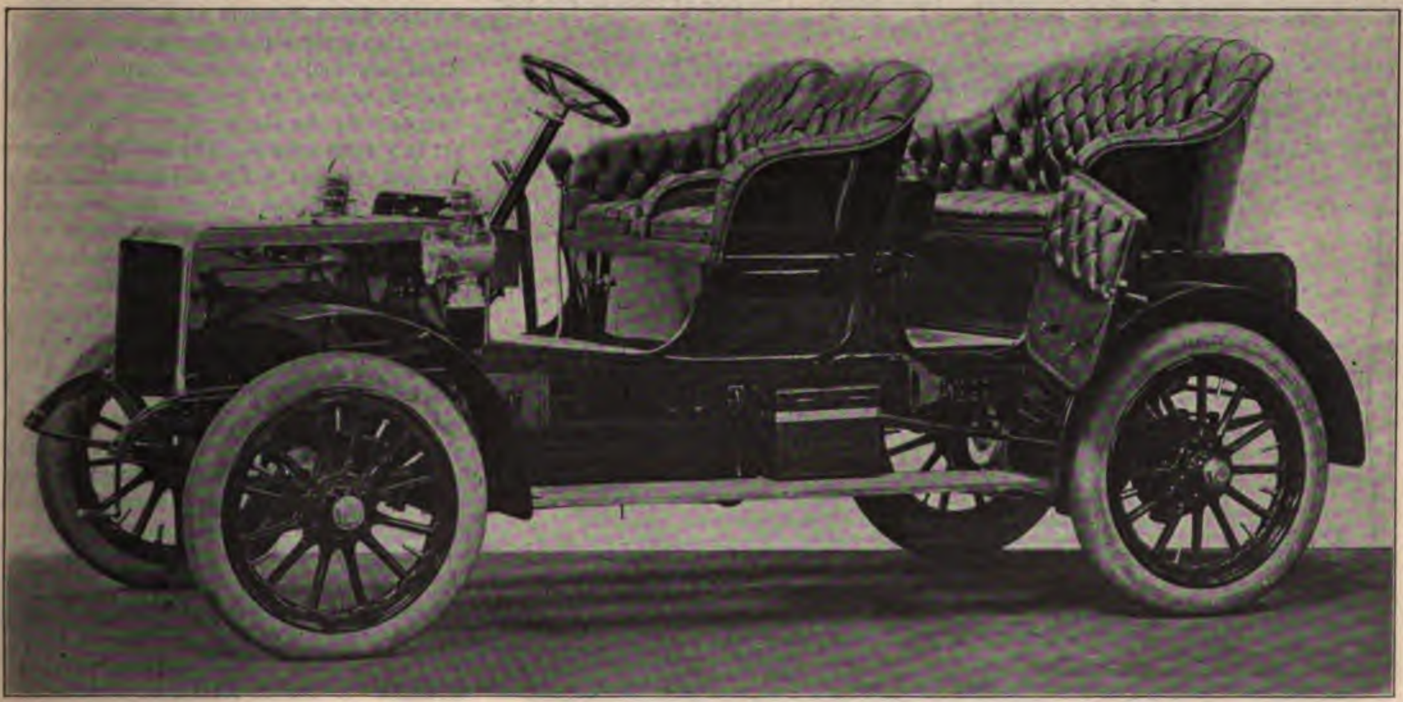


Fig. 1.—New Winton Four-Cylinder Touring Car.

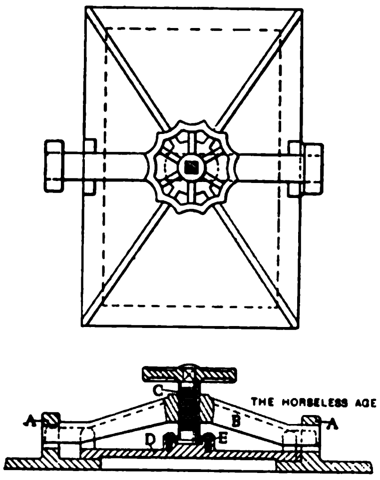


Fig. 3.—Hand Hole Cover.

rod proper by means of stud bolts, washers, castellated nuts and split pins.

HAND HOLE COVER LOCKS.

The aluminum crank casing is cast in two halves, being divided in a horizontal plane through the centre of the crank shaft bearings. It is provided with two hand holes on top with readily removable covers. This same kind of hand hole cover is used on the change gear case, and its locking means may here be described in detail. Referring to Fig. 3, the top half of the aluminum case is cast with two integral lugs AA, with square holes through them. Through these holes extend the ends of a brass yoke B of channel section. The central part of the yoke is solid, and is drilled and tapped to receive the hand wheel screw C. The outer end of this screw is provided with a collar or flange which fits in a socket formed between the cover D and the annular ring E screwed to it. When the yoke B is in its central position, each of its ends extending through one of the lugs A, and the screw C is turned up tight, the cover D is held securely in place, and the screw C is prevented from jarring loose by the spring force of the yoke B, which causes the threads to bind. To remove the cover, it is only necessary to loosen the hand wheel screw C a turn or two, shift the yoke B to one side until one of its ends clears the lug A, and then lift the yoke and the cover E together.

AIR CONTROL SYSTEM.

The cam gears are of steel and hardened, and are encased in an aluminum box at the front of the crank case. To the forward end of the cam shaft is secured a small crank for operating the air pump, which is thus run at only one-half the speed of the engine. The air pump cylinder, which is of cast iron and arranged vertically, is of larger dimensions (2½ x 3 inches) and generally more substantial than in the two-cylinder car. The pump takes its air from the crank chamber. The piston is of cast iron and fitted with packing rings, the same as the engine pistons. The pump operating crank and the connecting rod are arranged in an aluminum casing which communicates with the crank chamber, and these parts run in oil. The crank is a drop forging, and is keyed and clamped on the end of the cam shaft. The pump delivers into a brass receiver, to equalize the pressure. In the new car the air pump is located closer to the inlet valves than in the old one, and all connections of the air system are made by 5-16 inch copper tubing.

Referring to Fig. 4, A is the air pump and B the receiver. C is the suction pipe of the pump and D the delivery pipe, which connects between the pump cylinder and the receiver. This pipe D leads to the four inlet valves E E E E. A branch pipe F leads from pipe D to the foot valve G, and another branch pipe H to an air cock at the bottom of the steering column, which is controlled by a small lever on the steering column, below the steering wheel. I is the discharge pipe from the cock. As is well known, if both valves are kept close, the air pressure in the system is maximum and will allow no opening of the engine inlet valves. By opening either valve, the air pressure on the piston (R Fig. 2) secured to the inlet valves is reduced, the inlet valves open and the engine develops speed and power.

The air pressure of the control system is also used for feeding oil to the engine, the pipe J leading from the air pump through the pressure reducing and regulating valve K to the oil compartment in the tank L. Another pipe M leads from the pressure regulator to a pressure gauge on the dashboard, on which the oil feed pressure can be read. The oil feed pressure is carried at from 1 to 4 lbs. per square inch.

The engine is supported on the frame side members by lugs N N cast on the cylinders and brackets or feet O O of channel section bolted to the crank chamber. The cylinders are bolted to the crank case in a very substantial manner with cap screws provided with nuts inside the crank chambers.

THE CARBURETOR.

A new design of float-feed, spraying carburetor is used, and the gasoline needle valve interconnected with the inlet valves of the engine has been dispensed with. The gasoline flows from the tank (provided with a strainer under the filling cap) through a strainer provided with a drain cock, to the float chamber A of the carburetor, which it enters at B. The carburetor is constructed almost entirely of aluminum, and is provided with a cork float C secured to the gasoline valve D directly. At the bottom of the float chamber is a drain plug P. The fuel flows from the float chamber A into the passage E and is drawn by suction through the passage F to the spray nozzle G, which may be adjusted by means of the needle valve H. The carburetor has both a main and a supplementary air inlet. Above the spraying nozzle is arranged an adjustable air shutter I which controls the main air inlet. The supplementary air enters through a tube J opening into the mixing chamber at right angles to the spraying nozzle. This supplementary air inlet passage contains a spring-pressed diaphragm K surrounded by a throttling cone L. The pitch of this cone and the length and tension of the spring M are so proportioned that for any speed of the motor the requisite additional air is admitted through the supplementary air inlet to dilute the mixture to the proper strength. It will, of course, be understood that the diaphragm K is opened by the suction of the engine and is wide open when

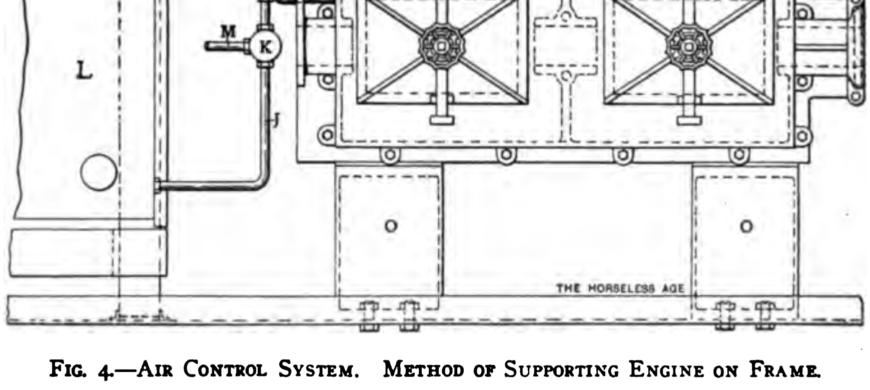


Fig. 4.—Air Control System. Method of Supporting Engine on Frame.

engine runs on full throttle at high
l, and closed when the engine is throt-
down slow. Below the spraying nozzle
cated the mixing tube N which con-
six pairs of reverse gauze cones,
gh which the mixture must pass on
ay to the cylinder.
will be noticed that this carburetor
rs materially from other float feed,
ying carburetors, in that the spray
le is inverted, and the gasoline is drawn
the nozzle by suction, instead of by
ity. A single carburetor supplies all
cylinders.

IGNITION.

mp spark ignition is used, the current
normally furnished by a battery of
storage cells. A battery of five dry
is provided, however, for use in case
accumulator should unexpectedly give
on the road. The spark plugs screw
tly into the cylinder walls on top.
uadruple vibrator coil is mounted on
dash (as shown in Fig. 7), one coil
connected to each cylinder. The
it breaker is of novel design, and is
ed directly underneath the foot-board
e the crank case, being driven
the cam shaft through a pair of bevel
, its shaft making an angle of fifteen
es with the horizontal. The circuit
er consists of a substantial cylindri-
fibre box, with hardened steel con-
by means of which the primary wind-
of the four coils are successively con-
d in circuit with the battery. The box
losed by an aluminum cap. It is
nmended to inject a little oil into
ircuit breaker box occasionally, to pre-
cutting of the contacts and abnormal
. A double plug switch is secured to
oot board, to which both the storage
ry and dry battery are connected, so
the change from one to the other can
adily made. The spark timer is ar-
d on the steering column, being the
one of the two little levers seen un-
ath the wheel in Fig. 1.

COOLING SYSTEM.

e cooling system comprises a centri-
circulating pump (P, Fig. 6) located
the crank case between the two pairs
linders, and driven by spur gears from
rank shaft at an increase of speed of
5. The pump is bolted to the bottom
e crank case, and has its shaft con-
d to the gear shaft S by a sleeve coup-
A large tank under the bonnet in
is divided into three compartments,
on the right being for gasoline, the
le one for oil, and that on the left for
. The water is taken by the pump from
ottom of the second radiator through
action pipe U, and forced by it to the
t part of the jackets. The delivery K of
ump connects to an aluminum con-
with two branches, one connecting

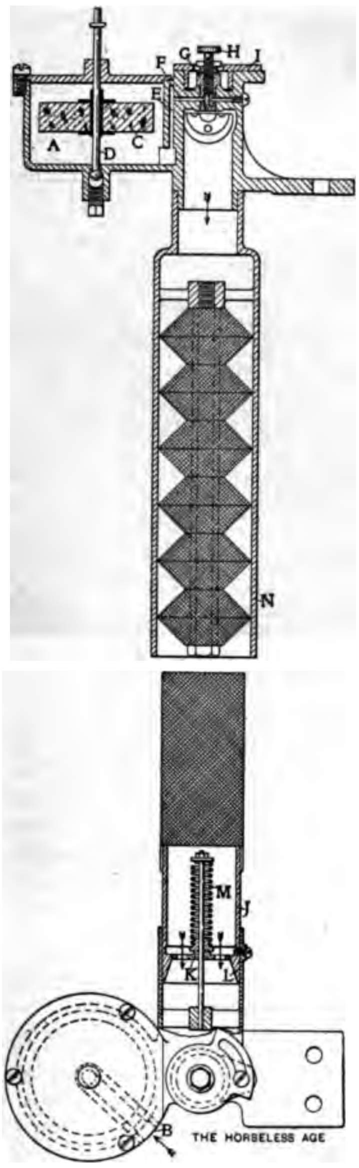


FIG. 5.—VERTICAL SECTION AND PLAN VIEW OF CARBURETOR.

to the jacket of each pair of cylinders. From the top of the jackets the water flows to the lower part of the main radiator on the right, and leaves the radiator on top at the

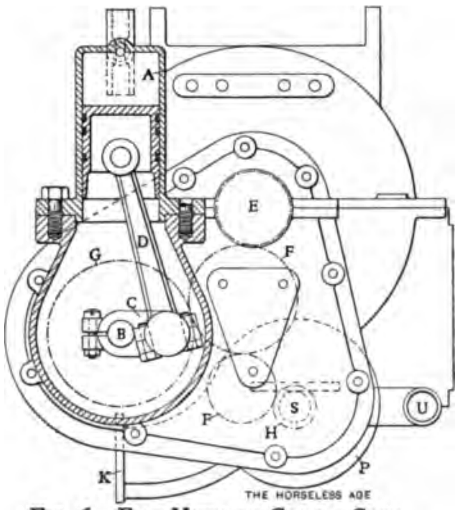


FIG. 6.—END VIEW OF CRANK CASE.

left, from where it passes to the tank and then to an auxiliary radiator underneath the tanks' and main radiator. A strainer is placed under the filler hole cap at the top of the tank. The radiator consists of 54 tubes, 9 high by 6 deep, of ½-inch copper tubing, with 1½-inch square fins. These open into cast aluminum headers in two parts, bolted together with a rubber gasket between. The tank and radiators form a unit, the heads of the tank being in one part with the inner half of the radiator headers. The water connections consist of steel tubes, rubber hose and aluminum connectors. The pump forms the lowest part of the cooling system and is provided with a drain cock. In Fig. 6, E is the crank shaft pinion, FF are intermediate pinions, G is the cam shaft gear, H the pump shaft gear, B the cam shaft, C the air pump crank, D the connecting rod, and A the air pump cylinder.

ENGINE LUBRICATION.

The engine and other parts are lubricated by an automatic sight feed oiler with eight individual feeds, located on the dash board. The lubricator consists of an aluminum casting, and all its feeds are separately adjustable. Two of the feeds lead to the outer engine bearings, and two to the intermediate bearing. The crank chamber is cast with a pocket in which the oil collects, and it is claimed that owing to the provision of this pocket, the amount of oil required to be carried in the chamber is smaller than would otherwise be necessary. By close inspection of Fig. 11, it will be noticed that a projection of the flywheel hub extends into the rear crank shaft bearing, and is turned with a sharp ridge from which any oil that works through the bearing is flung off by centrifugal force into the oil groove, from which it returns to the bottom of the crank chamber. The cams are practically submerged in oil, and so is the crank of the air pump. The engine cylinders are lubricated by four sight feeds. In order that there may be no leakage of air from the oil tank, which is kept under air pressure, the filling cap of the tank is packed. Owing to the fact that the air pump draws its air from the crank chamber, a partial vacuum is maintained in the latter, and the oil fed to the outside engine bearings is drawn by suction back into the case. Every provision is therefore made to insure perfect cleanliness, as far as leakage of oil from the engine is concerned.

The engine is started by means of a crank in front of the frame, which remains always in place. It engages with the forward end of the engine crank shaft by means of a spiral ratchet, and is held free when not in use by a spring. However, it is seldom necessary to use the crank, as the engine can generally be started by simply putting in the switch, the circuit breaker having first been set in a "late" position.

All four exhaust nipples connect into a large header (4 x 24 inches), serving as an

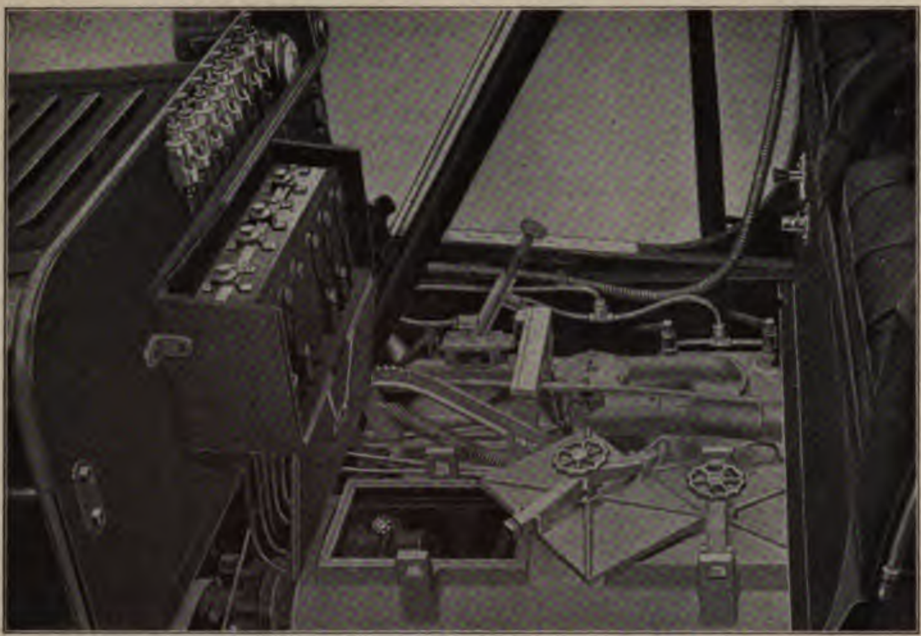


Fig. 7.—View of Motor on Car, Lubricator, Coil, Etc.

expansion chamber, and from this header the exhaust gases are led through a two-inch pipe, carried upward into the body, to the second expansion chamber located just forward of the back axle. The latter consists of a plain cylindrical chamber arranged parallel with the axis of the car, and provided with a discharge tube of comparatively small diameter.

The flywheel is keyed to the engine shaft at the rear end, with a transverse groove milled in its hub to receive the tongue of the floating member of a coupling interposed between the engine shaft and the change speed gear. This coupling is shown in detail in Fig. 8. The central or floating member A consists of a circular disk with a tongue on either face, the two tongues making a right angle with each other, and engaging into corresponding grooves, one in the hub B of the flywheel, and the other in disk C at the forward end of the transmission shaft. It will readily be seen that any disalignment between the engine and change gear case will not be productive of binding in the bearings of either, as the coupling employed serves both as a universal and a sliding joint.

THE CHANGE SPEED GEAR.

As already stated, the change speed gear is essentially the same as that employed on the 1904 touring car model, which, as is well known, gives two forward speeds and one reverse, by a system of individual friction clutches for each change of gear. On the high forward speed the transmission of power is direct, with all gears running idle. All of the clutches are of the conical type, with steel and bronze members respectively. Owing to the fact that there is no bearing between the gears on the countershaft B, it has been possible to shorten the case considerably. The cover on the gear case is the same as that on the engine crank case. The high speed clutch C is operated through the intermediary of three steel pins D passing through the web of the low speed gear E. The hub of the high-speed clutch C passes through the rear bearing on the gear case, and has secured to it outside the gear case the forward universal joint F in the propeller shaft.

The low-speed forward is one-quarter the high speed, and the reverse still a little lower. The change speed gear is operated by means two levers, one controlling the high speed and the emergency brake, and the other the low speed and reverse. The propeller shaft is provided with a sliding joint protected with a leather boot, and with a second universal joint just in front of the driving gear case. Both universal joints are completely enclosed. The bevel gears for the drive to the rear axle are cut of steel, with four pitch teeth.

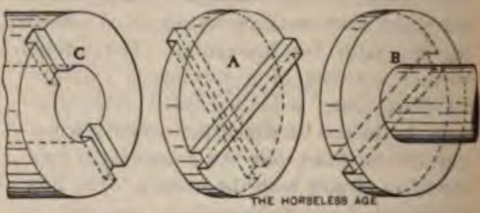


Fig. 9.—Parts of Engine Coupling.

The gear case is partly filled with oil, and the gears splash it up over the bearings. The latter are cut with pockets, to return the oil working through them to the case.

BRAKES.

Two independent brake systems are provided, one being a band brake acting on the casing of the forward universal joint in the propeller shaft, and the other, double brakes acting on each of the rear wheel hubs. The emergency brake consists of a ribbed bronze ring, and is operated by the same lever which controls the high forward speed. The hub brakes are pivoted on brackets (B, Fig. 10) depending from the rear axle bearing housings, and are operated by means of a rod extending clear across the frame, and guided in the middle by passing through one of the bolt holes in the rear axle casing. These brakes are operated by means of a foot lever with ratchet lock, the pedal segment being bolted to the engine crank chamber. A long rod connects directly from an arm depending from the brake shaft to the pedal lever.

AXLES.

The rear axle is a live axle, encased in 3-inch, seamless steel sleeves, which carry

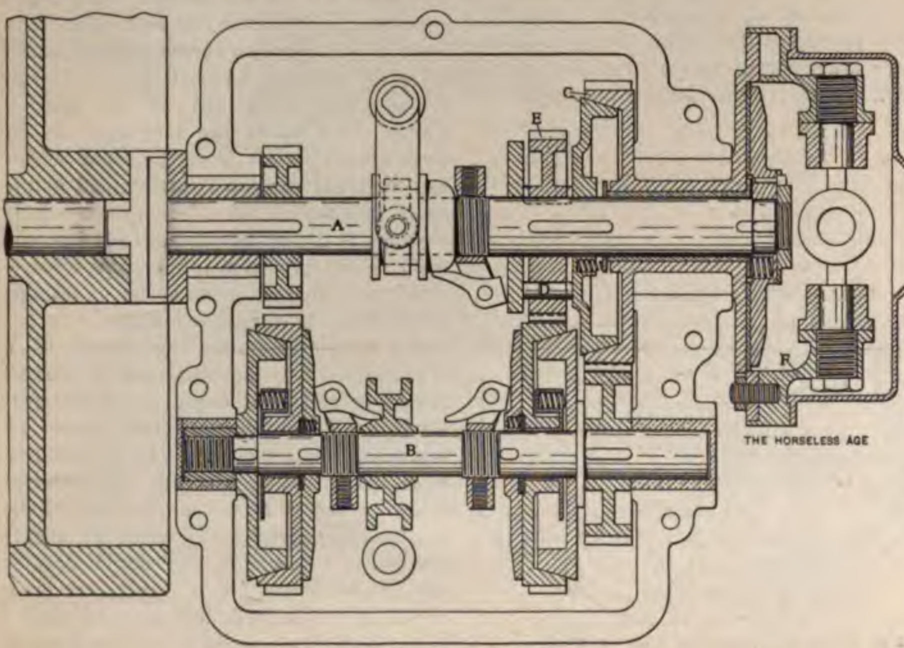


Fig. 8.—Change Speed Gear.

ving gear casing near the middle. :le is mounted on ball bearings con- of four rows of one-inch balls. All e bearings are adjusted for wear. it is necessary is to loosen the , screw up on it sligthly, and again. It will be seen that the drums are integral with the hub . The alignment of the driving and gear can be adjusted by means cap screws L L. The differential of the spur type. The rear axle ied by thrust braces on the trans- gear case, and, in addition, side rods are provided to prevent the :tting out of alignment with the A double truss T T runs from the :aring housings to the lower part of ing gear case. The inner ends of the f axles are squared, to receive the gears of the differential, and to the id of the axles are keyed and pin- road wheel hubs.

ront axle is a 1½ inch square, solid r forged at its ends with Lemoine knuckles, which are lined with ushes, and provided with a fibre washer on the lower face, and an on top. The front wheels are 32 n diameter, shod with 4-inch clinch- and mounted on one-half inch ball). The rear wheels are 34 inches eter, and have 4½ inch tires. The are of artillery construction, with le hubs.

ame is of pressed steel construction, ompany's own design, the section of members being of channel form, 7 eep at the center and reduced to 1¾ t the ends. The members are pressed form as to adapt them for the ready ent of the various fastenings, and other requirements. For instance, he rear spring hanger is fastened to r side of the member, a short length

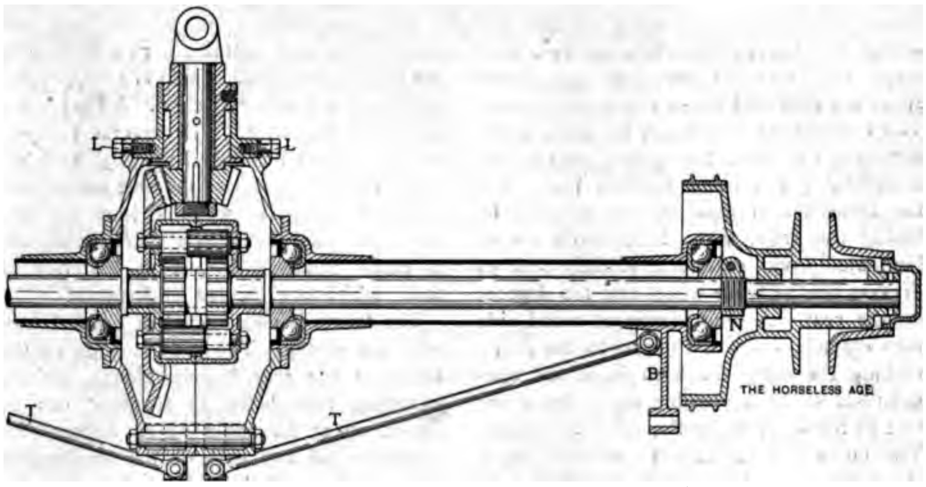


FIG. 10.—REAR AXLE AND BEVEL GEAR DRIVE.

is made square, to facilitate fastening the hanger, and the lower edge of the middle section, where the engine and gear case are supported, is also made square. The upper edge of the side member in front is slightly inclined downward, to give the characteristic Winton bonnet effect. A round bar in the rear, fastened into the malleable spring horns, serves as a spreader. A pressed steel stamping is used as the forward spreader, and also as a bearing for the starting crank and to carry the forward end of the radiator. The rear end of the radiator is supported by a two-inch steel tube riveted to the side members. The frame is supported in front by five-leaf, semi-elliptic springs, 38 x 2 inches, which are shackled at the rear end; and at the rear by six-leaf, semi-elliptic springs, 44 x 2 inches, shackled at both ends.

STEERING GEAR.

The car is steered by means of a 14-inch laminated wood hand wheel secured to the upper end of a shaft passing through a tubular column. To the lower end of the shaft is secured a steel worm meshing with an adjustable sector, furnishing a back lock gear through which the steering motion is transmitted to the road wheels. The worm and sector are enclosed in an aluminum casing in two halves, clamped to the two-inch steel tube which supports the rear end of the radiator. The lever arm on the sector shaft is fastened on a square section, and clamped. The link from this arm to the left hand steering knuckle has adjustable ball and socket joints, while the connecting rod between the two knuckles, which is located back of the axle, has the usual forked joints. The steering column is inclined at an angle of 60 degrees to the horizontal, which affords plenty of room for the driver to enter and leave his seat. One and three-eighths turns of the hand wheel are required to move the road wheels from hard-over one way to hard-over the other way.

The body is a side entrance tonneau with cast aluminum body sides and tonneau doors. The front seats are divided, and at the rear of these seats is a small box,

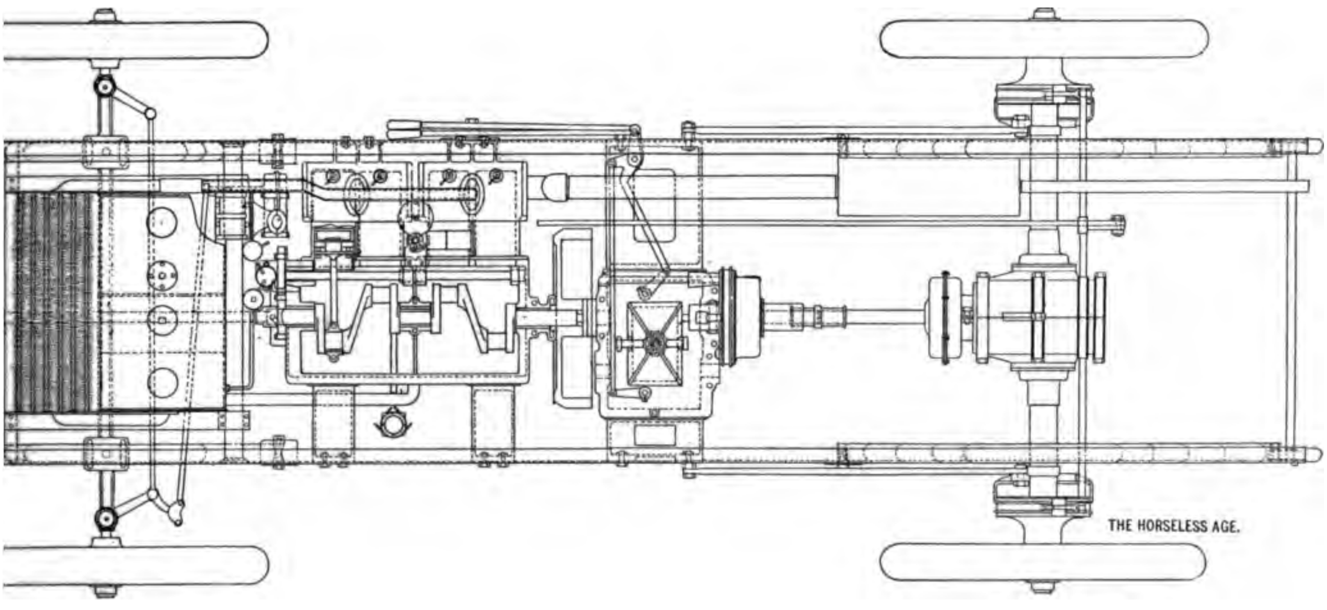


FIG. 11.—VIEW OF CHASSIS COMPLETE.

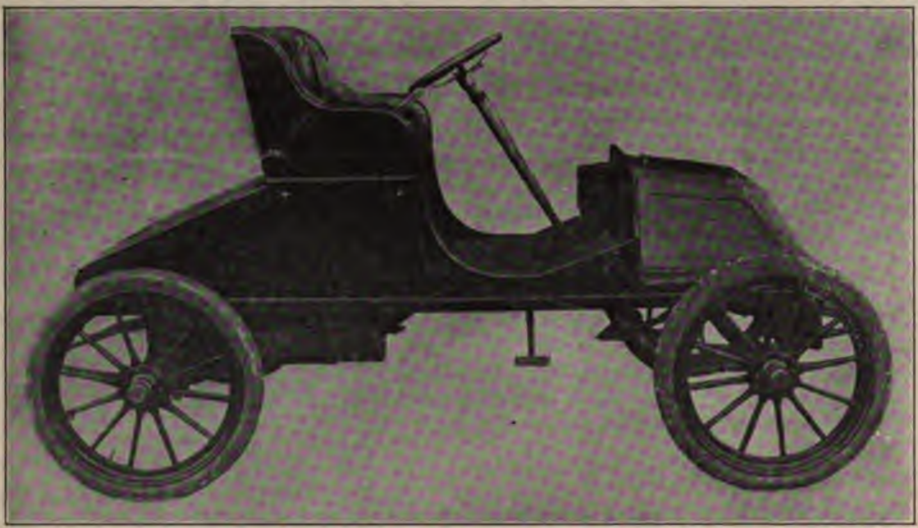
lined with leather, extending all the way across the body, for putting gloves, road maps, etc., into. A tool box and locker space are provided under the tonneau floor. The entire floor board can be taken up in sections, exposing the plugs, carburetor, commutator and other ignition parts, and the transmission gear can be reached by lifting the front seat. Mudguards are of laminated wood, extending slightly over 90 degrees on the front wheel and 180 degrees on the rear. A long laminated wood side step extends from one guard to the other, making the entry for both front and tonneau seats. It is possible to go from one seat to the other while the car is in motion. The tanks and radiator are covered by a sheet aluminum bonnet which is bolted to the frame. The equipment includes lamps, a tool outfit, etc. The car weighs about 2,100 lbs., and its speeding and hill climbing abilities should satisfy all requirements.

The Gale Car.

The Gale car, manufactured by The Western Tool Works, of Galesburg, Ill., is one of the latest additions to runabout automobiles of Western manufacture. The engine is single cylinder 5" x 6", of a nominal speed of 800 revolutions per minute. It has mechanically operated inlet and exhaust valves, and is very accessible for all adjustments. The engine is controlled by a foot throttle, and the spark advance lever is located at the side of the seat. The water tank holds four gallons, and the gasoline tank five. The radiating coil is 24 inches long and has twelve tubes with fins brazed on. The muffler is of special construction, and the engine is said to be practically noiseless and almost free from vibration. The pump is bolted on to the crank case, so it is impossible for it to get out of line. A Kingston carburetor is used, and a Splitdorf vibrator coil, in connection with two sets of batteries, of six cells each.

The transmission is of the sun and planet type, and contains a new feature in the high speed clutch, which is a cone clutch instead of a flat-face friction. All gears are steel and hardened. The reverse is operated by a foot lever, and the high and low speeds by one lever on the side of the car. Wheel steering is used, and is of the tilting type. The bonnet is a sheet metal, and is easily removed to get at batteries or tank, which are located underneath.

The frame is constructed of channel iron and very strong. The body is hung on the frame at the rear by pin hinges, and by loosening two bolts in front, it can be tipped up at an angle of 45 degrees for inspection of any part of the mechanism. It can be removed by loosening the pins in the hinges. The differential is of the spur gear type and has an emergency brake located on it. The chain is of the detachable variety. The rear axle is in one piece, the differential driving one wheel by a short sleeve. Midgley wheels are used, with ball bearings throughout. The springs are full elliptic, 42 inches long, front and rear, making the car very easy riding. Tires are double tube, 28 inches by 3 inches, and the wheel base is 80 inches.



The Gale Runabout.

A large carrying space is provided under the tonneau floor board. The car is quite speedy, and will run easily 30 miles per hour, it is claimed. The body is provided with a tonneau board, but no tonneau is supplied. The weight of the car complete is 1,000 lbs., and the range on one filling, 100 miles.

The Western Tool Works report that several cars of this model have run over 5,000 miles this year; and outside of tire troubles there have been no replacements of any sort. This firm is also completing tests on a double cylinder 5" x 6", which will have a two seat surrey body and a 96 inch wheel base. They also make 2 and 4 cylinder gas engines and transmissions, both from their own patterns and to order.

The Rose Carburetor.

The Rose Manufacturing Company, of Bradford, Pa., write us, with regard to our recent description of their carburetor, that "The throttle, when shut, is not tight, but allows enough mixture to leak by to run the motor slowly. The valve in closing strikes the end of the gasoline valve and depresses it to the position shown. The gasoline nozzle is adjustable up and down by means of a screw. With the throttle closed, the nozzle is lowered just enough to allow the correct amount of gasoline to escape for the throttled speed. The needle valve gives the correct amount of gasoline for the high speed, and the springs regulate the flow between the slow and high speed."

Thermit in Automobile Repairs.

Paul Meyan tells in his *France Automobile* of a repair job expeditiously accomplished by means of the heating compound "thermit" invented by Dr. Hans Goldschmidt, of Essen, Germany. While in Florence, Italy, recently, on a visit to the Florence Automobile Works, a broken pump shaft was brought to the works to be repaired. It was from the car of a tourist "of note," who was obliged to stop over until the repair could be effected, consequently it was of importance that the job should be done as expeditiously as possible. "Can we have it back to-morrow night?" asked the man who brought the broken part. "It will be done in an hour," replied M. Desson, manager of the works. These few words, continues M. Meyan, aroused my curiosity, as may well be imagined, and I followed the operation closely from beginning to end.

On a refractory brick was formed a sort of trough of clay, and on top of this trough were placed, end to end, the two parts of the shaft to be welded, in such a manner that there was a free space all around the part, to allow the fused metal to penetrate under the piece and all around the break. The parts being placed in position, a dark powder was put into the trough, sufficient in quantity to fill it up to above the piece to be operated on. A little white powder to act as a flux was put on top of the black powder, and was then set on fire by means of a match. The white powder fused and the black powder immediately became ignited, projecting bluish sparks.

The trough or crucible of clay was broken, and the shaft was clamped in a vise. The unevenness at the joint was filed down and the shaft polished, and a quarter of an hour later the tourist had it back. M. Desson explained that in the same manner a broken carriage spring or any other broken piece of iron or steel may be welded together with little trouble. The compound is an aluminum powder, which in burning or oxidizing develops an enormous heat. It is supplied by the Goldschmidt Thermit Co., Exchange Place, New York.

LESSONS of THE ROAD

Automobiling in Central Minnesota.

By N. H. W.

The Minnesota sky was blue and cloudless; the new touring car shone in all the glory of its spotless enamel and glittering brass, and we four congenial occupants were in the merriest of holiday mood. Nothing remained but to choose our road and be off, for an ideal May day was never meant to be wasted indoors, and that new car fairly cried out to be tested.

We decided upon the route from St. Paul to Faribault, a distance of about seventy miles, for the sand was not too heavy and the hills not too high, and, moreover, after the first twenty-five miles it was untried ground to all of us, and what motor car party ever existed that did not revel in the joys of exploring?

Our start was not exactly in the early morning hours, as we had first arranged, for there was a long wait necessary at the repair shop to replace a rear wheel, its spokes having been broken the day before when the machine skidded on the wet asphalt pavement and came in violent contact with the curb. The old wheel was finally replaced with a new one, and at last the crank was turned and we started, a jolly party of four whose combined ages would fall some ten years short of a hundred. It was a matter of only a few minutes to leave the city, and, crossing the river, we turned to the right and for a while turned our backs to the stream. After a few miles past small farms and villages, we again met the river, bending and turning through its wide bed many feet below us as we flew along on an almost perfect road on the top of a high bluff.

ON THE BANKS OF THE MISSISSIPPI.

Leaving the river, the road strikes out on the open prairie. Could anything equal the joy of gliding through the exhilarating air warmed by the warm May sun, every breath a pleasure, and spirits tuned to the highest pitch by the swift, smooth motion? Every part of the machine worked beyond our expectation; there was no jarring, no rattling, the only noise we could hear being the whirr of the chain, with an occasional toot of the horn. We did not expect this to last long, as the country beyond was more hilly, and in some places where the road runs through swamps it would, we knew, be difficult going. The run through this valley is the most beautiful part of the trip, nothing but varied and rolling prairie on both sides of the road as far as you can see, and it was to our regret that we found it did not last. We now met with hills, and our car fairly flew up the slopes as easily as it ran down the other side. This is living! At full speed the dust streamed behind us like a comet's tail; and with eyes blinking against the wind, it was little short of flying—the excitement of sailing with no waves to wet us, the thrill of tobogganing with no hill to climb afterward.

The small village of Rosemont was left behind with no little excitement as we passed through its dusty streets, the country folks in this district are far from being accustomed to the rush and whirr of the motor car, and with one accord they rushed to their horses' bridles at the first hint of one on the horizon. As if the poor old country horses were high strung thoroughbreds! There was one anxious moment, however, for drawn up on both sides of the road were some twenty teams which had come from miles around to attend a funeral, and we just escaped causing a runaway to the hearse. It was avoided, however, by careful stops and pauses. About a mile or so out of town we stopped at a farm house, for we had now covered a full twenty-five miles, and both the machine and ourselves needed refreshment. Very refreshing the water was too, though strongly flavored with iron, as farm house water generally is.

A FARMER'S COMMENTS.

It was noon hour, and the owner of the farm and his hired men watched with unfeigned interest as mysterious valves and wheels were uncovered and oiled, and various screws adjusted. "Go pretty slick in 'er, can't you?" "Give me hosses every time." "How about getting stuck in the mud?" "She looks fine now, but wait till you come back." "Terrible things for scaring teams." Amid such comments as these we made ourselves comfortable again, and assured that all was in smooth running order, we continued on our way.

What roads, what air, what a machine! We did not envy the birds their wings; blissfully happy in the rapid motion we were whirling along what looked like a long level road, and had just settled ourselves for a fast spin when—bump, bump, bumpty, bump—what was the matter? There was a bad marsh to be gotten over for a mile or two, and the road builders had solved the problem by making a corduroy road of it. The dirt had worn away from part of it, and the ribs stood up in bold relief. Our springs were good, however, and we were not dismayed, until we looked ahead and saw where some half dozen of the cross logs had given away, the result being a deep hole filled with black, oozy mud. On investigation the marsh on the right of the road appeared somewhat drier, so we decided to make a detour into it—too enthusiastically, alas! for when we essayed to join the road again the wheels began to sink, and our hearts with them. This side was much worse than it appeared at first sight, and looked hopeless. But it would have been ignominious to turn back within eighteen miles of our destination. We all alighted and scattered in every direction to see what we could find in the way of drift wood. Gathering up everything in sight, we soon manufactured a corduroy road on our own account. A doubtful one and a narrow one, to be sure, but with the car lightened and able assistance in the rear, the chauffeur triumphantly made a skillful turn which carried the front wheels to the widest part of the amateur bridge.

MISHAPS NEVER COME ALONE.

We passed on through the small village of Castle Rock to Northfield, and were congratulating ourselves on disproving the ancient proverb as to misfortunes, when the most serious accident of the trip overtook us, and without warning. (I will say here that it is almost impossible to find anything in the shape of a repair shop in any town along this route.) The smooth prairie was vanishing behind us, when a sound like the report of a pistol sounded in our ears. Of course, this meant a puncture, and upon investigation it proved to be a serious one, for one of the rear tires had a gash in it about an inch long. We were in a quandary fifty miles from St. Paul, a bursted tire and

NO JACK.

No farm house was in sight, but we remembered having passed one a mile back. There was nothing to do but to go back and beg, borrow or steal the much needed jack from the farmer. The two feminine passengers insisted that they needed exercise, so they accompanied the chauffeur on his dusty way, leaving one disconsolate passenger to guard the machine. We were lucky enough to find some one at home, and had no trouble in getting the desired jack. At first we were afraid that the jack would not be strong enough for our heavy car, but it was managed, and after a delay of about half an hour, and with the help of expressive remarks as to the manufacturer who would allow such a tire to be placed on the market, the tire was fixed.

A quick trip was made to the farm house, and the jack was returned with many thanks before we turned toward our destination. The remaining miles were soon disposed of, and our hungry, windblown party was glad to alight and, after a hasty attempt at removing some of the dust, sit down with enormous appetites to the best the hotel could afford. Outside the silent car was the centre of an admiring crowd, and as the turkey and dessert disappeared on the inside, we discussed in exclamatory style the perfection of the roads and the general dependableness of the automobile which carried us so well.

AN EDUCATIONAL CENTER.

After dinner we took a hasty ride about town, now quite pretty with its cathedral, Episcopal buildings, Seabury institute, Shat-

tuck Military Academy and other schools. On our return trip we were much amused at meeting just outside of the little village of Dundas, a buggy well filled by a young man and two country girls, when the horse showed signs of bolting as we approached. Those two girls were out and on the ground, one on each side, before our driver could stop the machine. Luckily no damage was done, so we continued on our way home. We stopped for a few snap shots in Northfield, a pretty little place made famous by the bank robbery by the James and Younger boys. Its shady streets and tidy college building give it more the appearance of an Eastern town than a Western.

We varied the way home, trying different roads, and avoided the corduroy road by taking a cross road, leading past the Cannon river. We were well repaid, as the scenery along this river, well known for its horrible Indian battles, is grand.

The car was running smoothly, and we had no trouble until we had nearly reached the little way station of Westcott. There it began to miss badly. Upon investigation we found that the spark plug of one of the engines was cracked. This was soon remedied, however, by putting in a new one, and we were soon on our way again.

When we reached the Mississippi bluffs again, it was nearly dark. The lights across the river showed like a map the streets pricked out by many street lamps. The happy sleepiness caused by many hours out of doors wrapped us in silence as we rolled up to our own doors.

A Lost Luncheon--Across Country in An Automobile.

By Lillian Palmer Powers.

It was during the superheated days of last May, that we were bidden to a luncheon in town, and we decided to start in the freshness of the dawn, so as to accomplish our journey in the cool of the morning. On the inspiration of the moment the night before, as Lemuel and I sat comfortably on the portico in the soft moonlight, we ordered a five o'clock breakfast, but when aroused betimes for it the following morning, a seven o'clock breakfast seemed suddenly more feasible—and it was our usual eight o'clock breakfast to which we at last sat down.

After breakfasting we had a discussion with a carpenter and an exhaustive argument with the gardener, who clings to his own opinions with the tenacity of old grape vine roots to the soil; so it was nine o'clock when we hung up the telephone receiver for the last time and with a sigh of relief climbed into the machine.

We started! Oh! the joy of that first dash down the mountain road. The blossom-scented air exhilarated us like wine—down—down—down into the valley we swept like a swallow on the wing. "Our troubles are over," I complacently remarked to Lemuel, "and now we must have a good time." "And make up for lost time," asserted Lemuel shooting out of the village beyond the speed limits.

All seemed "auspicious as a May morning." Swarms of yellow butterflies rose from the road bed at our approach. The brilliant yellow orioles played tag with us, and the robin red breasts sauced us from their coverts in the pink-blossomed apple-trees. Fat farming horses pranced in a portly manner at our approach, and little children capered and screeched to us as we shot past. We swept into the second village with the wind in our faces and peace in our hearts; but before we left the second village green behind us I noticed a film of anxiety overspreading Lemuel's countenance. "I think," he remarked nervously, "that we had better take in some water; our tank perhaps is not quite full enough." So we stopped at the next watering trough, and I held Lemuel's coat while he poked and prodded at the interior of the machine and monkeyed with its complications. The farmers who drove up to water their horses all passed the stereotyped jokes with us about our steed "Bein' thirsty" or "Bein' balky," and after many vociferous "whoas," "Stand still, will ye," and "Glang there," passed on.

A humane young man approached who was walking to ease his plodding horse drawing a load of wood. He (the young man) gazed at us sympathetically and disappeared down the road. Lemuel all this while had continued investigating the "innerds" of the machine.

Finally he divested himself of the overalls he had donned, remarking brusquely, "Well, we can start, but she isn't behaving as she ought at all," as if our machine had been a vicious elephant.

We started, but Lemuel was preoccupied, I apprehensive. We passed the young man walking beside his load of wood, and we all bowed politely. About a mile further on, Lemuel suddenly wrenched his machine to one side of the road, stopped, and announced abruptly, "A valve needs packing." Observing that he was now in no mood for light banter or repartee, I meekly alighted and took account of stock—or hair pins—for I invariably lose one or two on every automobile ride; I discovered in this instance that my big pet tortoise shell hair pin was missing,—"one to which I was particularly attached," I mournfully announced to Lemuel, and he sarcastically rejoined that "evidently it was not sufficiently attached to me." Then conversation languished. Packing a valve seemed a hot and not a particularly enviable job. It grew warm—warmer—warmest—and passed beyond that superlative degree. The young man with the wood team walked past us and gazed commiseratingly in our direction. At last Lemuel again divested himself of the overalls, we climbed into our seats once more, and soon passed the young man with the wood team! Lemuel made some joking remark to him relating to the race between the hare and the tortoise.

As we spun on smoothly for several miles, the lines of care began to fade from Lemuel's face. I presently drew his attention to the resemblance a distant mountain had to the head of a Siberian convict, for a sharp dividing line ran over it, one side thickly wooded, the other side entirely bare. We counted the smoke of three forest fires in different directions within our range of view. I yawned and cuddled back more luxuriously into my corner as we started up a long steep hill. About half way up there came a new note in the customary whiz of machinery beneath us. "Oh dear! What is it now?" I cried piteously. Lemuel said,—well, never mind what he said—he backed us down to the shade of a spreading maple tree. Later, while Lemuel was exploring 'mid the vitals of the machine and I sitting forlornly on a stone wall, the young man with the wood team passed us, still walking. Lemuel did not, or would not, notice him, and the young man looked hurt, for he now felt like an old acquaintance.

Again Lemuel divested himself of his overalls, regarding the unregenerate machine the while resentfully, and, it appeared to my anxious eyes, a little distrustfully. It was discouraging. "Oh, Lemuel!" I cried, "why don't you get a touring car and take a chauffeur with us?" "All the pleasure," said he, "is in running one's own car, as in sailing one's own boat." "How about the time when said car doesn't run? You take your pleasures too seriously," I returned maliciously. In truth, he looked not on pleasure bent, for in unconsciously mopping his heated brow his grimy hands had left broad black smudges, and the rest of his face was also lightly touched up, which gave him a wild and grotesque appearance; his once natty shirt front was past the redemption of any laundress or even "Heathen Chinee." There was, moreover, such a gasolene glare to his eyes that I discreetly climbed in at once, merely remarking, "As luncheon is still twenty-five miles away, I think we had better stop at the next telephone station and notify Caroline that we shall be a couple of hours late anyway." Lemuel agreed to this by a brief nod, and when we had reached the level ground again after the long hill, he gave a mad "toot" and we swept past the young man walking beside his wood team. I threw him a friendly nod backwards.

Just as we entered the next village, we passed a little grave-yard just carpeted with the blossoms of the sea pink or old-fashioned "thrift." The graves were literally banked with it, the plots were covered with it, and its soft pinkness flowed over into the drives and blotted out the grass.

We found no hotel or telephone in the village. I went to the general store. Its atmosphere that hot day was filled, nay supercharged, with a quaint potpourri of

odors—codfish, shoes, patent fertilizers, and oiled jeans. In answer to my request for fruit, all in good faith, I was shown some dried prunes! These I politely declined. There were loaves of bread and cakes displayed. These, the clerk assured me, were quite fresh—he "had 'em in the first of the week!" As the day was then Friday, I did not find this encouraging, and purchased only a raisin cake, and that through dire necessity. The only beverage I could obtain was a bottle of pink liquid flavored with sarsaparilla. I essayed crackers and cheese, but when the glass charnel house containing the latter article was opened, I was forced to flee the place. I found, as usual, a curious crowd surrounding Lemuel's machine,—the smaller boys spattering water upon one another from the drinking trough, the men with hands in pockets and pipes in mouths in the usual attitudes of noon-day collapse. "How air ye, Jim, arter last night's weddin?" was the salutation of one lounger to another. "Folks say as how we ruther over*did* it, in the sendin' of 'em off." "His'n and hern famblies was in the thick ont," growled the other sulkily. The superior young man of the village passed along, with a know-it-all air. "Hey, you fellers!" he ejaculated contemptuously, "Haint ye ever seen one of them things before?" The crowd melted before his scorn, but almost immediately reorganized.

A peculiarly nondescript vehicle approached from one of the steep mountain roads. It halted in front of the village store. A lean and lanky individual from our crowd lounged over and accosted the driver of it. "Hello, Obed! Long time sence I seen ye. Got rural delivery up your way yit?" "Naw," snarled the person or personage addressed. "I aint paying no taxes to this guv'munt to fool away on state roads for state ijots to tear around on without hosses—" this with a malevolent glare in our direction.—"A-scaring of our cows in their pastures—and a-drying up of their milk. No, *sir,* the *wuss* the roads the *better* fur me. As fur free delivery, if I kin wait fur my *mail, it* kin wait fur *me,* and where it *belongs,* in the *post office.* If the guv'munt's so rich it better quit taxing us poor farmers and a tom-fooling away our money."

Having delivered this oration of wisdom, the sage departed with a brown jug into the store. His interlocutor returned with a cheerful grin to his companions. An old one-armed man with a pleasant face stood beside me and prefaced all his answers to my questions with a "Lord bless your heart? yes," whether he was in the negative or affirmative. "Lord bless your heart, yes" in reply to my inquiry if he were a civil war veteran. "'Twas in Car'liny, warnt it," chuckled one of the bystanders near him, "that ye bit into a persimmon and wa'nt able ter pucker yer mouth ter whistle yer dorg fer six years?" "Lord bless yer heart, yes,—ha—ha!" responded the old soldier reminiscently. "Plenty of persimmons and 'possoms in Car'liny—they was that thick 'bout camp, that when we heard the leaves rustle at night we'd just shie a stone in the direction of the noise, and the 'possom 'ud be skart and play dead; then one of the boys 'ud go out, find the 'possom, wind its tail round his finger like a pot-hook, and bring the varmint back to the tent, hanging head downwards—that peaceful—with paws folded cross its breast. Lord bless your heart, yes. Ha—ha!"

About this time Lemuel discerned in the distance the figure of the young man plodding beside his wood team, and then startled the assembled natives by rending off his overalls and almost throwing me and his accoutrements into the automobile. "Got so het up the sun's most teched his head," one of the jostled bystanders remarked explanatorily. "Lord bless your heart, yes," assented the old soldier.

Our wayward machine felt the desperation of the grip upon its guiding wheel and behaved dutifully at first, but at the end of several miles, as we were climbing a long ascent, a difficult laboring shook our steed. "Is this a new symptom of valvular trouble?" I inquired anxiously. "I do not think her valves needed packing, after all," rejoined Lemuel moodily as he steered the machine to a level spot and applied the brakes. "I think," he continued after a moment of deep gloom, "that her oil cup is obstructed in some way and, by the sound, the machinery dry, or nearly so." In silence I pondered on "the perversity of inanimate things" or, the "drattedness of unhuman things," as I once heard the quotation rendered with feeling. "Why don't you get out and kick it awhile?" I suggested recklessly. "It won't hurt the machine's feelings, and may relieve yours." Lemuel vouchsafed no answer to this childish remark and proceeded to don his overalls in chilly silence, but said silence was the only cool thing in that spot. Roadmenders had evidently been at work at a culvert nearby, and had lunched beneath the tree where we were stranded. Fragments of doughnuts and segments of egg shells lay scattered about. Wearily I got out that obsolete raisin cake and took a drink of the pink beer which in taste resembled a draught of tooth wash. While I made my repast, visions of daintily garnished sweetbreads and delicious cool salads appeared before my eyes, as I thought of Caroline's waiting luncheon.

Meantime Lemuel had applied his libations of oil and was "chooing" up and down the short level space of road trying to make the lubrication permeate the hot and choleric system of the machine. The dust thus raised fell upon the just and the unjust, and unjustly so, I bitterly thought sitting wearily by the roadside.

A farmer drove rattling down the hill. He hauled up. "Took ruther a warm day for pleasuring, hain't ye?" he inquired sardonically. As we did not prolong the conversation, he next inquired if we knew Mr. ———. "No?" interrogatively. "Well, he owns one of them thar gol darn machines, and so I calkerlated ye might know him." While I pondered that he was probably conversant with some such proverb as "Fools of a feather flock together," the man continued reminiscently, "Yes, sir! and 'twa'nt two weeks ago that he came a-whirring and whizzing down this here same hill, as hifaluting as ye please, and jest beyond the culvert thar if the gol darned thing didn't break its hind axle clean in tew, and me and my Bess here hed to haul it ter shelter fer repairs. I wouldn't give one of the gol darned things barn room if I had one guv to me. Glang there Bess," and Bess strode away, expressing her contempt for horseless carriages by a derisive flirt of her tail.

In time the young man with the wood team slowly approached and passed us. I was seized with a wild desire at that moment to send on a special delivery letter by him, telling Caroline that we "were on the road." Lemuel remarked that he hoped the young man would turn off on some byway soon, for he felt as if he never wished to see him again. He added that we might get in and start, but that he did not believe that the oil had "got there yet." So we left the remnants of the roadmakers' repast behind us at last.

It puzzles me why certain roadmakers consider a road finished when it is left in the condition of a newly-plowed field, with stones ornamenting its surface varying in size from that of a man's fist to that of a man's head. I am told that in the days gone by, when the farmers personally worked out their taxes, conditions were much better, as competition between the different sections of a town bore good fruit.

We proceeded several miles in a labored, asthmatical manner. Lemuel then remarked decisively that the oil was not working in properly, and that he should proceed thus no further, but should telephone into the repair station for assistance. At this fiat my mirage visions of luncheon faded away altogether. We stopped beside the road to "consider" as the cow is urged to do in Mother Goose rhymes.

As we sat there a round, Pickwickian old gentleman drove up in a green spring wagon. He was quite joyful over finding us thus becalmed, and asserted repeatedly that the chance "was wuth ten dollars" to him to get "Fanny accustomed to autterbiles." Fanny was so sausage fat that she had lost all semblance to equine anatomy. He passed and re-passed us; when directly opposite the machine, Fanny would give a couple of India rubber up-and-down jounces and then resume her placid amble. In time her fiery spirit was sufficiently subdued and the plump couple departed, the old gentleman thanking us as heartily as if we had paused for his especial accommodation.

Lemuel finally started on foot cross lots for some neighboring mills, in order to telephone, and I walked up to a little house

nearby. The mistress of the house, white-haired and genial-faced, I found very cordial. She showed all her flowers and presented me with slips and roots of some old-fashioned perennials and herbs, and she showed me the small pond that "father" had dammed up in order that she might grow pond lilies. I asked her if she were as fond of birds as she was of flowers. She said in answering me that there were few birds left in the neighborhood; that the summer before a gang of Italian workmen had camped in the vicinity and had constantly killed and eaten the small birds in spite of the law against it, and as the migratory birds usually return year after year to the same localities, she had noticed that this season the usual song birds were conspicuous by their absence.

The shades of evening fell. My new friend kindly invited us to supper, and I made the acquaintance of the house cat, christened "Nuisance." I found Nuisance on a patchwork quilt behind the stove complacently nursing three little Nuisances.

A train at last arrived that condescended to stop at the little nearby flag station. With it came aid from the repair station. Soon afterwards we were able to start for home, and our placated machine well permeated with oil as with the milk of human kindness, we "flew like a bird to the mountains." The frogs sang sonorously in the marshes as we passed and the black whispering woods seemed so mystical and still, it seemed a sacrilege to shoot into their sombre silence with our brazen toot-toot of warning. The black, low-lying pools looked weird and sullen in the night-time, and our New Engand hillsides with granite crags rising from groups of pines and hemlocks seemed in a sort of fairy phantasy to be turret and bastion, the wild, sweet fern pastures as likely abodes for prowling banditti, and a belated train shrieking across a high trestle in the distance with a banner of sparks trailing skyward looked to be a fiery dragon flying against the horizon.

Once the headlights of our automobile flashed upon a leviathan of a turtle lumbering across the road from one marsh to another. He was dazed at first as our searchlight struck him, but "collected" himself at our approach, and as he lay in the hollow of the road there was no collision. Once, oh horror! as we turned a sharp curve, our lights flashed for one instant upon a humble little black and white animal a short distance away. I saw no more as I slid beneath the leathern laprobe. Lemuel grasped the wheel frenziedly; his face could not have expressed more consternation if a two-year-old child had stood in our path. A wrench, a swerve, and as at the same moment the nimble little animal leaped into the bushes we *all* were saved. We passed pretty little home pictures framed by the windows of farmhouses close beside the road; and ever like "Upidee" we "kept getting upper," climbing the steep wooded mountain road. Occasionally an owl hooted in the darkness at our approach—higher, still higher—like a homing pigeon we strained for home. What a haven of rest it looked to us from its eminence, with lights streaming from windows and welcoming portico!

I sipped my coffee that night from a seat beside the telephone, and received from it, in a continual stream, the glories and the menu of the lost luncheon, also pity and reproaches. I was about to share and retail it all to Lemuel, but upon glancing across the room to the further side of the fireplace, I saw him sunken in an easy chair with his hands in his pockets, and sleeping as sweetly as if no such thing existed as nightmares and automobiles.

St. Louis Tour Entries.

Following is a list of those who had sent formal entries for the St. Louis tour up to July 8:

H. W. Whipple, Andover, Mass.; Boston to St. Louis.

John Farson, Chicago, Ill.; Chicago to St. Louis.

C. H. Gillette, New York city; New York to St. Louis.

W. T. White, Cleveland, Ohio; New York to St. Louis.

Elliott C. Lee, Boston, Mass.; Boston to Buffalo.

A. R. Pardington, Brooklyn; New York to Albany.

Dr. Julian A. Chase, Pawtucket, R. I.; Providence to Albany.

Dr. W. E Milbank, Albany, N. Y.; Albany to Buffalo.

Augustus Post, New York; New York to St. Louis.

Frank X. Mudd, Chicago, Ill.; Chicago to St. Louis.

W. C. Temple, Farmers' Bank Bldg., Pittsburg, Pa.; Pittsburg to St. Louis.

R. P. Scott, Baltimore, Md.; Baltimore or New York to St. Louis.

Charles J Glidden, Boston, Mass.; Boston to St. Louis.

Wm. Monypeny, Jr., Columbus, Ohio; Columbus to St. Louis.

H. W. Smith, Syracuse, N. Y.; Syracuse to St. Louis.

George S. Waite, Cleveland, Ohio; Cleveland to St. Louis.

James L. Breese, New York; New York to St. Louis.

H. Frederick Lesh, Boston, Mass.; Boston to St. Louis

Thomas B. Jeffery, Konosha, Wis.; Boston to St. Louis.

A. J. Wills, Akron, Ohio; New York to St. Louis.

Haynes-Apperson Co., Kokomo, Ind.; New York to St. Louis.

Hart D. Newman, New Orleans; Baltimore to St. Louis.

Sam Stone, Jr., New Orleans, La.; Baltimore to St. Louis.

Royal R. Sheldon, Boston, Mass.; Boston to St. Louis.

Dr. W. E. Rolfe, Boston, Mass.; Boston to St. Louis.

Paul H. Deming, New York; New York to St. Louis.

George H. Lowe, Boston, Mass.; Boston to St. Louis.

Ray D. Lillibridge, New York; New York to St. Louis.

Cecil P. Wilson, Boston, Mass.; Boston to New York.

A. P. Pendleton, St. Louis; New York or Boston to St. Louis.

W. E. Metzger, Detroit; New York to St. Louis.

F. N. Manross, Forestville, Conn.; Bristol, Conn., to St. Louis.

E. H. Wallace, Freeport, Pa.; Pittsburg to St. Louis.

Charles R. Greuter, Holyoke, Mass.; Springfield to St. Louis.

F. A. La Roche, New York; New York to St. Louis.

G. Douglas Neare, Cincinnati; Cincinnati to St. Louis.

Frank K. List, Wheeling, W. Va.; Wheeling to St. Louis.

F. C. Donald, Chicago; Chicago to St. Louis.

George Otis Draper, Hope Dale, Mass.; Worcester to Albany.

Echoes of the Gordon Bennett Race.

It is reported that the German Automobile Club has closed the accounts of the expenses occasioned by the Gordon Bennett race. If the race was a brilliant success from a sporting standpoint, it was far from a success from a financial point of view. In fact, the deficit shown was much greater than had been anticipated, and the subscribers to the guarantee fund will be obliged to pay the whole of their subscriptions. The receipts of the race amounted to hardly 130,000 marks, while the expenses were double this sum. The erection of the large grandstand at the Saalburg absorbed no less than 95,000 marks. Certain means of revenue figured on failed entirely, among others the exhibition of the competing vehicles after the race, which did not take place, owing to only a single vehicle presenting itself. The flower carnival arranged for, for which numerous prizes have been offered, had to be abandoned for the same reason.

A man of marvelous dexterity must be Fred Honegger, who accompanied President Hotchkiss of the Buffalo A. C. on a 1,500 mile tour recently completed. A Buffalo paper credits him with the following "trick": "At one time while on that road the gasoline was low and Mr. Hotchkiss had practically given up hope of getting the car to the top of the hill, when Mr. Honegger put into use an effective trick. Using a gasoline gun he walked beside the car and shot gasoline into the engine at regular intervals, thus overcoming the failure of the carburetor to perform its proper functions. The hill was surmounted."

The Mt. Washington Hill Climbing Contest.

The results of the first day of this contest were reported in our last issue. On Tuesday, July 12th, the contest was continued, and again a number of successive record-breaking ascents were made. The first to scale the hill on Tuesday morning was F. E. Stanley, of Newton, with his little 6 h. p. steam runabout, who made a time of 28 m. 19 2-5 s., thus considerably bettering his time of 31 m. 15 s., made on Monday. It was shortly before 9 o'clock when Stanley arrived at the summit, and the weather conditions were then the most propitious, the sun shining brightly. Mr. Stanley was followed by A. E. Morrison, Boston, driving a 24 h. p. Peerless car. His actual time was 31 m. 6 4-5 s., but some delay was caused on the hill by overtaking Gordon Turner in an Oldsmobile near the six-mile post. Morrison was forced to run his car over the rocks of the roadside, which caused him to lose his bonnet and radiator and otherwise damage the car. Mr. Morrison claimed a delay of four minutes, but an allowance of only two minutes was accorded him by the judges, which made his official time 29 m. 6 4-5 s.

James L. Breeze, New York, also made another attempt for record time and bettered his record of 34 m. 9 4-5 s., made on Monday, by nearly three minutes, making the ascent in 31 m. 22 4-5 s. The summit of the hill was enshrouded in clouds when Harry Harkness, of New York, started with his big Mercedes racer to smash all the earlier records. He shot away from the start at great speed, and when a telephone message from the second mile post announced at the summit that he had made the first two miles in six minutes, it was certain that a new record would be established. The half-way house (four miles) was reached in 11 m. 30 s. and the six-mile post in 20 m. 30 s. Mr. Harkness completed the ascent in 24 m. 37 2-5 s., arriving at the summit in a dense fog, his machine remaining invisible to the spectators assembled at the finish, till it was nearly up to the line. It was immediately surrounded by all of the enthusiasts, as shown in one of our photographs.

The only car besides Harkness' to make the ascent in the afternoon was the Stevens-Duryea of Otto Nestman, which established a record of 40 m. 30 s. some weeks ago. Mr. Nestman was rather late in getting under way during the afternoon, but once he got started he moved up the hills and grades in fine style, and eventually reached the top in the time of 31 m. 22 4-5 s., which is more than nine minutes better than his previous mark. Upon reaching the top Mr. Nestman requested permission to compete in classes three and eight, the former of which was closed Monday, his request being based upon the fact that he was not aware that class three was finished. The referee gave him permission to start in event eight, either Tuesday afternoon or Wednesday, but declined to reopen event three.

A. E. Morrison in His Peerless.

At the conclusion of Mr. Harkness' record ride Mr. Morrison started up the mountain with his Peerless machine, but it plainly showed the effects of the hard banging of the morning, when it lost its bonnet and unswung its radiator. This fact, together with the weather conditions, it raining torrents at the summit, caused him to give up the trial. It was a wise decision, as the "Consolidated" motor truck, which started later, soon found to its salvation. This latter car, like Mr. Morrison's, had gotten beyond the two-mile mark when, on the advice of the officials at the top, coupled with those of the natives, its trip to the summit was abandoned as a heavy storm, which started in sleet, was raging.

Following is a description of the course furnished by H. W. Alden, of the Electric Vehicle Company, Hartford, who drove a light 12 horse-power Columbia car in the contests:

"Leaving Glen Cottage, it makes two sharp turns and drops down about 100 feet, crossing the meadow, and is very sandy for about a quarter of a mile. Then it strikes into dense woods and begins to go straight up. The first pitch is very soft, with a lot of disagreeable water bars. There are, by

Harkness Finishing in the Clouds.

WINTON CROSSING THE LINE AT FINISH.

the way, just 365 'thank-you-ma'ams' from base to summit. The starting point is a very hot place on a warm day, being on the east side of the mountain. There are several very bad turns and sharp rises of fully 20 per cent. grade with soft and sandy surfaces before the Half Way House is reached. At the fourth mile point the timber line is passed and the road becomes all gravel and harder. The fourth and fifth mile contain the hardest climbing. In the fourth mile there is one long lift straight up for 2,000 feet. Just above the sixth mile there is a short, sharp turn and very soft of 22 per cent. grade. Just at the top of this follows a long 15 per cent. grade and at this point the contestants met with a lot of trouble. Further up the grades are not so bad, although there are several quarter-mile stretches of 10 and 15 per cent., but by this time you must get used to anything. All vegetation disappears at the six-mile pole and nothing remains but rocks. Just before the final finish an easy 3 per cent. grade permits the survivors to make good speed. Altogether the road surface is not so bad as it mght be, and the grades are not impossible for a well-built car, but it is the number of the grades and the sudden turns that make the climb so difficult."

Following is a summary of the day's climbs:

Class 8—For vehicles weighing from 1,000 to 2,000 pounds, any equipment, power or horse-power.—Won by A. E. Morrison, Boston (24 h. p. Peerless). Time, 29 m. 6 4-5 s. Two minutes allowed for accident. Second, Webb Jay, Cleveland, Ohio (10 h. p. White steamer). Time, 42 m. 19 4-5s. Third, L. J. Phelps, Stoneham (20 h. p. Phelps). Time, 47 m. 20 2-5 s. Fourth, H. W. Alden, Hartford (12 h. p. Columbia). Time, 51 m. 50 2-5 s. Arthur Gardner driving a 16 h. p. Rambler broke his transmission gear and dropped out.

Class 7—For vehicles not exceeding 1,000 pounds in weight, any equipment, power and horse-power.—Won by F. G. Peabody, (6 h. p. Oldsmobile). Time, 20 m. 46 s. Second, Benjamin Smith, Boston (Special Steam). Time, 2 h. 16 m. 55 s. Third, Gorden Turner (in same car). Time, 2 h. 25 m. 51 2-5 s.

Class 12—For motor cycles.—Won by Arthur Batchelder, Waltham (2 h. p. Metz). Time, 34 m. 11 3-5 s. Second, F. R. Dickinson, Waltham (Metz). Time, 52 m. 42 2-5 s.

Class 9—Open to any vehicle, and weight, horse-power or power.—Won by Harry Harkness, New York (60 h. p. Mercedes). Time, 24 m. 37 3-5 s. Second, F. E. Stanley, Newton, Mass. (6 h. p. Stanley Steam). Time, 28 m. 19 2-5 s. Third, James L. Breeze, New York (40 h. p. Mercedes). Time, 31 m. 22 4-5 s. Fourth, Otto Nestman, Chicopee Falls, Mass. (7 h. p. Stevens-Duryea). Time, 40 m. 45 s. A. E. Morrison, in a Peerless, started, but turned back below the Half Way House. Webb Jay, in a White steamer, did not start, although entered.

F. H. PEABODY IN HIS 4 H.P. OLDSMOBILE WITHIN A QUARTER MILE OF THE SUMMIT.

On Wednesday morning a heavy rain was falling and the summit of Mt. Washington was wrapped in clouds, and the hill climbing contest was consequently declared off. Shortly before noon the weather cleared up, and the visitors held a meeting and organized an automobile parade to start at half past two in the afternoon. Twenty-one cars carrying 77 passengers participated in the parade, the procession being headed by Harry Harkness' 60 h.p. Mercedes, who carried with him, as a guest of honor, Gov. W. J. Batchelder, of New Hampshire. The start was made from Bretton Woods, the vehicles proceeding to Fabyan's, a distance of a mile, and back, and then turned east and climbed the 400-foot grade to the Crawford House at the gates of the Crawford Notch. At the return to Bretton Woods a salute of thirteen guns was fired. All of the cars which satisfactorily completed the hill climb participated in the parade.

The officials held a meeting on Wednesday afternoon and considered two protests. One was against Mr. Morrison, of Boston, on the ground that his Peerless was over the weight called for in the class in which it competed. Mr. Morrison was not present at the meeting, having started for New York, where he was to compete in the races Saturday, but it was officially stated that he had declined to weigh his car, and Referee Pardington disqualified him in class event 8, which gives first prize in that class to Webb Jay, White steamer, the second to L. J. Phelps, Phelps car, and the third to H. W. Allen, Columbia.

The second protest was that of Otto Nestman, against the award of prizes in event 3, and was not sustained.

The Stanley record breaker changed hands and is now the property of K. Kendall, of Goffstown, N. H., who, taking advantage of the selling conditions of the entry, immediately upon its arrival at the Summit, Tuesday, purchased it for the price in the entry, $670.

On Thursday a tour was made of the Northern slope of the White Mountains, starting from Bretton Woods, proceeding via Fabyan's, Maplewood, Franconia, Sugar Hill, Bethlehem and Profile House and return to Bretton Woods. The start was made at 7 A. M. There were nearly twenty starters. The week of events came to a close on Friday, with a second endurance run, in which ninety-three miles of hills and valleys were traveled over in a ride around the Presidential Range. Starting at

eight o'clock, eighteen vehicles were sent away at intervals of a quarter of a mile between each. The first stretch of forty-five miles brought the tourists to Jefferson and Randolph, through the Pinkham Notch, at the base of Mount Madison, to the Glen House. After a fifteen minute halt, Jackson, twelve miles away, became the next objective point. Here General M. C. Wentworth entertained the party at luncheon, after which the tour was continued through to Intervale and North Conway, back to Bartlett Bemis and the Crawford Notch to the Crawford House and Bretton Woods, which was reached about five o'clock.

Following is a list of medals awarded for the tours in connection with the Mount Washington Hill Climbing Contest:

Gold Medals: H. W. Alden, Gasolene Columbia, 12 h.p.; James L. Breese, Mercedes, 40 h.p.; Arthur Gardiner, Rambler, 16 h.p.; Webb Jay, White, 10 h.p.; Geo. H. Lowe, White, 10 h.p.; Frank Nutt, Haynes-Apperson, 12 h.p.; John G. Prouty, Winton, 20 h.p.; Percy Pierce, Pierce, 24 h.p.; Harlan W. Whipple, Mercedes, 40 h.p.; Harry Fosdick, Winton, 20 h.p.; C. C. Hildebrand, Stevens-Duryea, 7 h.p.; B. A. La Mont, Cadillac, 8 h.p.; F. E. Stanley, Stanley, 6 h.p.; L. R. Speare, Winton, 20 h.p.; Mrs. L. R. Speare, Winton, 20 h.p; Alexander Winton, Winton, 24 h.p.

Silver Medal: L. J. Phelps, Phelps, 20 h.p. (for perfect work the first day).

White Mountain Endurance Run: at the Sinclair House, W. Bethlehem.

Trade Literature Received

Western Auto Supply Co., 285 Virginia street, Milwaukee, Wis.—Circular of a three-speed sliding change speed gear with spur differential.

Carl E. L. Lipman, Beloit, Wis—Circulars of the Lipman rotary pump and sparking plug.

Seidler-Miner Electric Co., 207 Jefferson avenue, Detroit—Circular of the S.-M. spark plug.

The Schacht Mfg. Co., Cincinnati, O.—Catalogue of Schacht gasoline cars.

The Brew-Hatcher Co., Cleveland, O.—Circular of B.-H. force grease cups.

Stich-In-Time Vulcanizer Co., Topeka, Kansas.—Circular of the "Stich-in-Time" vulcanizer.

G. & J. Tire Co., Indianapolis, Ind.—"The Home of the G. & J. Tire."

The Welch Motor Car Co., Detroit, Mich.—Catalogue of the Welch touring car.

Club Notes.

DALLAS A. C.

Steps have been taken to incorporate the Dallas (Tex.) Automobile Club so as to put it in a position to relieve members of personal responsibility for unavoidable accidents. The membership of the club is said to be growing fast.

FORT WAYNE A. C.

A race meet is being planned by the Fort Wayne (Ind.) Automobile Club at the local mile track on July 29th and 30th. The event is expected to attract some of the men who hold records.

A. C. OF DAVENPORT.

Articles of incorporation have been prepared for the Automobile Club of Davenport, Ia., by which the permissable indebtedness for a club house is limited to $10,000.

CHICAGO A. C.

At a dircetors' meeting of the Chicago Automobile Club last week, Sidney S. Gorham, Frank X. Mudd and Ira M. Cabe were asked to prepare a bill to be submitted to the city council as a substitute for the new automobile ordinance, which the club is trying to have repealed. The revised measure will name a speed limit of 12 instead of 10 miles. Efforts will also be made to do away with the examination of applicants for licenses. Seventeen new members were admitted. A party of twenty members of the club will drive to South Bend, Ind., on Aug. 4th to meet the tourists en route to St. Louis.

JOLIET A. C.

A large number of the automobile owners of Joliet, Ill., organized last week under the name of the Joliet Automobile Club, on the occasion of a run to Electric Park, Plainfield. Lee D. Fisher, manager of the Joliet Automobile & Garage Co., and a member of the Chicago Automobile Club, has been active in the formation of the club. The club's quarters will be in a new garage to be built by the company of which Mr. Fisher is manager.

Rambler Car which Competed in Hill Climb.

COMMUNICATIONS

Enthusiastic Over French Cars.

SALEM, Mass., June 14.

Editor HORSELESS AGE:

I have just returned from a short trip to Europe, and while there I naturally looked at automobiles. I did not make any special efforts to either see or test them, or otherwise gain any particular knowledge of the condition of affairs in the horseless carriage line, but still, the information I picked up was sufficient to show me that the ideas gained from seeing foreign machines in shows could not be compared to that acquired by looking at them on their native soil.

The first machine I saw was a small touring car in Dublin, and although I traveled considerably in that country, I saw only this solitary specimen. And even London is not thickly peppered with the horseless vehicles. Very few were seen in the business section, but around Hyde Park they were fairly numerous—that is, about as they might be seen on an ordinary day in the suburbs of New York city. The Britishers cling to their own notions pretty well, for many of the cars were of their own make, and they were not pretty to look at. There were some magnificent machines, but they were in the minority. The majority I saw were rather small cars, and noisy as well.

Although I had expected to see dozens of heavy trucks hauling merchandise in the business section, I only found two, loaded with beer barrels. Both were operated by steam. I had read considerably of the success of the horseless omnibus, but although I was in the streets for six days, I only ran across a single machine. That was operated by a gasoline motor, and it did not appear to appeal to the Englishmen, for it did not carry a single passenger, while the horse-drawn vehicles on the same route were crowded. However, it may have just happened to be a dull spell. I trailed along after the machine for some distance, and it certainly did work well, but it was not making money for the owners. Going across Waterloo bridge one morning, I met a big road engine hauling a whole circus outfit, there being certainly a dozen wagons in the train. A man walked in front to clear a way.

It did not strike me that England was motor-mad by any means, for in a city the size of London I had expected to see the latest styles of automobiles, and in good numbers. I also had thought that there would be many big trucks and delivery wagons, but although I kept a sharp watch I did not see a single light vehicle devoted to business purposes, except a few motor cycles carrying a box for small parcels.

In Edinburgh automobiles were rather plenty, and there is a line of motor wagonettes running on the principal streets. They are Daimlers, carrying eight passengers, and the route is a mile long, for which the charge is two cents for the trip. The wagons are owned by their drivers, and they run from either terminal, just as they see fit, for no schedule is adhered to. Yet the dozen machines give about one minute service. I rode in one, and it was not pleasant, for it had hard rubber tires, rattled a good deal, and the steering gear wobbled so much I was afraid we would run down the electric cars. I judged that business was not profitable, for all of the wagons were in need of repairs, and some had hard-looking tires.

Brussels showed a number of French machines, but they were not numerous. I didn't see a single machine in Holland, but was told that automobiles were owned by wealthy people who lived in the country districts, where they had gone for the summer months.

Paris appears to be the centre of automobilism. There the first I saw were several big machines in the railroad station waiting for their owners. And through all the streets the tooting horn was heard constantly.

I found the Parisian cab horses so antiquated and slow that after one day's trial I became disgusted with equines, and looked about for an automobile. A little inquiry put me on the track of several men who own carriages for hire. I engaged an intelligent Frenchman who had a Panhard tonneau. It was a two-cylinder, eight horse power, with room for five people. The owner said it was a 1900 machine, and it had tube ignition. This machine took us an average of 100 miles a day for five days, and was in constant use from 10 A. M. to nearly 10 A. M. of the following day, as it carried us all about the city night and day. And the owner thought we were mighty liberal people when we paid him $15 a day, as he only asked $14, and he supplied the gasoline, oil and took the risk of his tires going to pieces. Some folks think Paris is an expensive place, too. In Boston or New York it costs $5 or more an hour to hire an automobile.

After the first day's run I was rather interested in the machine, for it carried a party of four up hill and down, at good rate, and generally at the top speed, while the second pulled us up the grades, and there were some stiff ones in the villages near the city. The engine ran the carriage as fast as we wanted to ride, because the roads were not always smooth. At the end of the second day I asked to look at the gears and engine, and I found that, so far as appearances go, the machinery was in fine condition. The owner said he had run the carriage three years, using it every day he could get an engagement, and in all that time he had never broken anything serious. He said that I could easily buy a carriage like his for $600, but he would not sell, because he was accustomed to the machine and felt safe in starting for any place. Of course, he was a careful driver, and did not take any chances. In narrow places he always slowed down and let the other machine rush by, and he also ran slowly on rough roads.

This 1900 French machine had a good sized tonneau, with high backs, well upholstered, separate front seats, fine springs, 4 x 32 inch tires, wooden wheels, wheel steering, and was in every way what I called an up-to-date carriage—judging from the American standpoint. And best of all, it traveled five days without a hitch or stop, even though it had the old-fashioned flame ignition apparatus. The tubes worked finely, and I was surprised to see what a little time it took to start up with them. The driver had a piece of wire with two prongs on it, covered with waste. This he dipped into a small can of alcohol, and then lighted it. The flames were put into the tubes, and in less than a minute the engine could be started.

Of course the old machine lacked many of the new ideas, but notwithstanding the deficiencies, it ran well, and appeared to be good for many years of work, for there was no rattle, and no apparent looseness in joints. As we rode along I could not help thinking what a difference there was between the French 1900 model and the American machine made in the same year. Here was what we could call a new model, built away back nearly five years, and still running, while our own makers had not advanced to the same point until last year, and I guess the "advance" was only in appearances—outside at that.

I was sort of looking around for a bargain in a machine, and found a 1903 Panhard that had been used for demonstrating—at least I was told so. The machine did not have a scratch, and the leather was not even specked, so I knew it could not have had much use. I asked if it was in running order, and was told that it would be taken out at once and I could see what it would do. This was surprising, because in this country casual inquirers are not often invited to ride in a machine off-hand. A mechanic gave the crank a few turns, and the four cylinders gave forth cheerful noises. This engine had both tube and electric ignition. A young man who could talk English mounted the seat and ran the machine into the crowded street. He took us on a long ride through city and country without stopping for a single adjustment, and so far as I could see the engine ran perfectly. I asked for a hill test, and we were taken to a rather steep and long up grade. Just to show what the engine could do, the driver started on the second speed, and kept changing until he was on the fourth, all the time up grade, and constantly increasing the velocity until we were travel-

30 miles an hour. This gave me a new of what a French 15-horse carriage d do, for I never saw an American car- e change to high speed gears on an grade.

his 1903 carriage had side entrance to tonneau, with a very wide rear seat. act, there are now very few tonneaus in Paris—unless very old—with a rear . And it seemed to me that all the new hines were with side entrances.

had expected that in Paris I should see dreds of 40 to 90-horsepower automo- dashing along at from 20 to 60 miles iour. I was disappointed, for when a o 90-horsepower machine did appear it rare enough to arouse the driver's at- ion, and he always pointed them out, they could pass us on up grades. It ared as though of the thousands of ma- es used in the city and suburbs the ma- y do not run up to over 10 horsepower, those of that size are often fitted to y six and eight passengers. Hundreds roughams and barouches are used, and I ild judge that a good many had been loyed for several years, showing that ideas of the French builders are some- g in advance of our own manufacturers. as told that a Frenchman bought an mobile as he does a house—and he ex- ed it to last about as long. This may xaggeration and perhaps applies to the dle classes, who do not have a lot of to spend on new models.

had looked for hundreds of motor de- y wagons, but careful watch through retail business section failed to discover 1 in droves. There were two or three, the big stores did not have them—at t they were not around the places when as there.

aris is full of automobiles for sale; in , the ordinary carriage is a drug on the ket—that is, the size machine usually hased in this country for from $2,500 to 0. In Paris I could have bought a fine iage of last season's model, with plenty ower and without a mark to show its at a price that would have landed it in country for about the price now ged for new American carriages of l capacity. There were, of course, many low-priced machines in the market, but standard motors seem to be worth good ey, just as in this country.

nce I have returned home I have won- d considerably how it is that when our makers could have found in France as back as 1900 such a model of a machine rode in, they persisted in turning out freaks that were put upon the market , and are even now offered and sold— ks not only in appearance but in work- ship. We all know the sort of things made here in the tonneau line. They narrow seats, hard springs, and were ly torture machines—some are still e in that way. The Frenchman was g in a comfortable carriage five or t years ago.

I dislike to criticize American automobiles, but after five years' experience with them, and with plenty of chances to observe how other people fare, I am forced to the conclusion that something is out of joint here. Either the roads are too hard on machinery or else the mechanics do not fasten things together as they should do. To illustrate this, I may cite a job just done on my own carriage. One cylinder started exploding any old time, and often not at all. Investigation showed that the cam opening the exhaust valve had worked loose on the shaft, and therefore the valve did not operate properly. The machine was taken apart and the shaft pulled out. That cam, which must do very hard work, was a separate piece of metal fastened by a small pin and the pin had sheared off. It would, of course, have cost more to have turned the cam and short shaft out of a solid piece of steel, but it would have been less expensive to me if the builders had done so. And so on. This car of mine has been used only a few times lately. Last fall it was put in perfect order by the builders, every worn part being replaced and the repair bill was something to look at a minute or two. Since then it has been apart three times, and always it is something different. Last Sunday I was out and had some trouble because two of the piston rings broke. I could not help thinking how much profit there would be in running such a carriage at $15 a day if the repair bills must be paid from the receipts. I figure that the owner of the outfit would be obliged to get another income to keep the car traveling if it was in commission every day. Yet I do not think my experience is much harder than the ordinary automobilist.

ROBIN DAMON.

Some New Ideas in Kerosene Burners for Automobiles.

Editor HORSELESS AGE:

I was very much interested in the article on kerosene burners in the HORSELESS AGE of July 6, as I have been experimenting on this line for the past three years. When I first took this subject up, I was told by all the experts I asked for information on the subject, that it could not be done, on account of the kerosene cracking under the influence of heat and clogging the passages with carbon, and also causing a smoky flame. They all said that the only practical method was that based on the spray or atomizing principle, either by steam pressure from the boiler or by compressed air. One of the engineers of the Westinghouse Air Brake Company, who was familiar with the attempts to burn oil in the locomotive fire-boxes of several of the southwestern railroads, told me that they had not been able to overcome these three objections—smoke, carbonization at the tip of the jet, and a loud, disagreeable roaring noise.

I had already had some experience with jets of this type, and while I never had any trouble with carbonizing or smoke, I had never been able to suppress the roaring, and this alone made this form of burner useless on an automobile, as you could hear the burner for a quarter of a mile. Besides, it required either compressed air or steam to atomize the oil. Compressed air gives a better fire, but requires a constantly working pump, to keep up the pressure in a supply tank which should be heated by exhaust steam from the engine. Steam, while not giving quite as clean a fire, is much simpler to apply, only needing a pipe and valve from the boiler, but, on the other hand, to start the fire under a cold boiler requires air pressure to be pumped in to the burner by hand until the fire has raised 15 or 20 lbs. of steam. The best system of controlling the fire is to have the automatic regulator control the steam or air supply and to supply the oil from a float feed chamber which would keep the oil supply level below the level of the atomizer. I finally abandoned the atomizer principle, on account of the objections noted above, and turned to the Bunsen burner principle.

I started out with a burner of standard design, i.e., having air flues through the body of the burner. I used a rather large vaporizer chamber, filled with gauze and small nails to catch the carbon deposit, and the regulation regulator, throttling the vapor as it passed to the burner. I soon found that, except when the fire was burning very low, the pressure in the fire-box was above atmospheric pressure, which caused a slight back pressure down the draft tubes in the burner. Evidently, under these conditions the tubes were useless for the purpose they were put there for, and, if anything, they allowed the fire to down flash and retard the draft through the boiler, rather than the reverse. I put a solid plate under the burner, practically closing the holes airtight, and the fire drew up into the boiler flues better and gave no indication of smoke or lack of air. From this I deduced the first requirement of a satisfactory burner, viz., that the proper amount of air for perfect combustion should be mixed with the jet of gas in the interior of the burner, and then driven by the pressure right through the fire-box and up through the boiler flues. The burner being solid and the fire-box airtight, and there being a slight pressure above atmosphere in the combustion space, the result is a forced draft, and there can be no such thing as back draft, even if the wind should blow straight down the stack.

I now found that my vaporizer was not making an invisible gas, but a misty sort of steam when the burner was on full, but when throttled down about one-half it was invisible, until the automatic valve shut down to its lowest limit, when the vapor again became visible. The vaporizer plainly was not heating the oil hot enough to make a super-heated vapor, first when the valve was supplying fuel to the full limit

of the nozzle, and secondly when the pressure in the burner dropped and allowed the fire to drop down under the vaporizer. I now found that the jet and cooler parts of my vaporizer began to clog with carbon, but the hotter parts showed no signs of deposit. From this I argued that the vaporizer must be kept red hot all the time, and that the oil must be regulated before it was vaporized and not allowed to flood into a partly cooled vaporizer to recondense the vapor and deposit the carbon. I had now found requirement number two.

As my burner could not very well be adapted to an enclosed pilot light to keep a continuous heat on the vaporizer, I began looking for a burner which would fulfill the first requirement, and which had a pilot light built into the body of the burner. I found a burner on the market which seemed to embody both my requirements. I fitted one to my car, and with it I fitted an automatic regulator which would control the oil supply before it reached the burner, and cut it off entirely when the steam pressure rose to the predetermined point, leaving the pilot to keep the vaporizer hot. I soon found that increasing the oil supply up to a certain point would increase the fire correspondingly, but beyond that point the vaporizing tube would seem to be unable to take care of the oil, and would flood, just like a flash boiler when more water is supplied than the fire can evaporate. I remedied this by increasing the length of the vaporizer coil, which consisted of a piece of seamless steel tube of 1¼ inch pipe size.

This burner has been in use since August, 1903, and has driven my car upward of 4,000 miles. The vaporizer has never shown the least sign of carbon deposit, and the gauze strainer in the tip of the jet has only been examined three or four times, and each time only a few pieces of scale from the inside of the tube were found to have lodged in it. This, to me, is absolute proof that coal oil will not deposit any carbon, when vaporized in a red hot tube, and not allowed to cool or recondense before it is delivered to the burner. The burner itself shows no signs of carbon, and burns a perfectly blue flame with never a sign of smoke. This method of burning the fuel is practically the same as in an internal combustion engine, as after they have introduced the proper mixture of air and fuel it is not considered necessary to have any additional valves for introducing more air during the combustion stroke, so why should there be any additional air introduced into the fire-box under a boiler if there is already the proper proportion mixed with the fuel before it issues from the burner? This proportion is easy to obtain by simply varying the distance between the jet and the mixing tube, and this proportion will remain nearly constant, automatically as the air feed will vary with the velocity of the jet of vapor. The fact that you have a combustible mixture in the burner would at first sight promise lots of trouble from back firing into the interior of the burner, but as a matter of fact, this never happened to me but once, and then was caused by the door in the casing being left open and the flame flaring out and igniting the gas at the jet.

To sum up, the requirements of a kerosene burner are:

First—No air supply to flame except the proper proportion for complete combustion which shall be intimately mixed with the vapor before ignition. This means a closed fire-box.

Second—All regulation of fuel to take place before vaporization. This means no cracked oil or condensed vapor in tubes, and hence no deposit of carbon.

Third—Ample vaporizing coil kept at a cherry red heat. This means perfectly dry vapor no matter how hard the burner is forced by high pressure on fuel.

A burner which fulfills the above conditions will give satisfactory results and vaporize and burn kerosene oil for an indefinite period without any of the troubles which every one seems to think are inseparable from using kerosene. The above is not a "theoretical dream" but an *actual demonstrated fact,* and some day will put the steamer where it belongs, as the finest touring machine to be had. I took a trip through eastern Pennsylvania and Maryland the first of this month, going 108 miles on July 2, 65 on the 4th and 5th, and 104 miles home on the 6th on 18 gallons of kerosene, over every description of country roads, down into the Susquehanna valley at Conowingo and up eight miles of hills, on which the throttle was never closed for the whole eight miles, and finished the last 40 miles through clay mud in the rain. Averaged 10 miles an hour on both the first and last days, and tightened one nut on my engine on the whole trip. This was done with a steam car built in 1899. I venture to say very few gasoline machines built in that year could make such a showing.

J. Frazier Bard.

Turnpike Company Demands Excessive Auto Toll Rates.

Editor Horseless Age:

The owner of an automobile, like charity, "suffereth long and is kind," but whether, like charity, he will endure all things remains to be seen.

Experience has taught him that he must expect to pay more and receive less than the balance of mankind. The limit seems to have been reached in this vicinity by the actions of the Alexandria Turnpike Company in making a toll rate of two cents per mile for each horse-power of an automobile travelling over their turnpike. This means that for a twenty-four horse-power machine the owner will be compelled to pay forty-eight cents for each mile traveled. For horse-drawn vehicles the toll has always been two cents per mile for each horse used, and it would seem that to the mind of the turnpike company horse-power and horse stand as equivalents.

The Alexandria pike is one of the best constructed and best maintained pikes in this section of the country, and leading, as it does, to the government post at Fort Thomas, Ky., where one can feast the eye on scenery of unsurpassing beauty, it has naturally been a road much frequented by automobilists. The roadbed being very broad and smooth, has no doubt led many an automobilist to indulge in the temptation to speed up. The turnpike company claims that this racing of automobilists along their pike is responsible for the high rate charged, as horse drivers are avoiding their pike for fear of meeting the fast flying automobiles.

Considerable indignation is felt by Cincinnati automobile users over the action of the pike owners, because of the fact that the president of the turnpike company is himself an enthusiastic automobilist and an ex-president of the Automobile Club of Cincinnati, having served the club in that capacity last year. The club at a recent meeting ordered a communication sent its ex-president, protesting against the action of his company and offering the services of the club in assisting to prevent by legal means the exceeding of the speed limit on this highway.

C.

Circulation and Lubrication in Cold Weather.

Editor Horseless Age:

In Dr. Daniel Longaker's article in a recent issue of the Horseless Age, he groans under the load of calcium chloride he used during the winter. Poor fellow! I was for a time in a position to sympathize with him, but if he had followed the advice I gave in the Horseless Age of January 20, 1904, his troubles would have ended. Quite a number did so.

One year and three days ago I sold everything except my sleigh front auto. I ran the auto the entire winter and to-day I would not accept the finest horse in this neighborhood as a present if I had to drive it. I never expect to own another horse to drive. And I do not fear the water cooled machine.

In December, 1903, I laid my freezing troubles before an oil expert of Logansport, Ind. I asked him to try getting me an oil that would neither freeze nor carbonize in the cylinder and yet have a high fire test.

After considerable trouble he had five gallons made for me. I put the oil in the machine about the first of January, and ran the balance of the winter without any trouble of any kind in the cooling system. There was very little loss, except from leakage, and when I took it out after the weather became so warm it would smell when hot, I still had about half a gallon left from the

lons, that had not been put in the . This added to two and one-fourth I took from the cooling system, left more than half of my original five Of course, I watched leakage very and during the warm spring it vaporized quite a little.

of the coldest nights last winter my had to stand out about two hours. went to start it the fly-wheel and were covered with crystals of lubri-il, and yet the cooling oil was per-luid. When I reached the livery here I kept it—I kept it in a cold he entire winter—the thermometer ed 21° below zero—the official neter 18° below.

the winter was over, I removed the the cylinder and did not find the dication of carbon in the cooling r. One must be very careful in cooling oil, for if he gets an oil that rbonize in the cylinder the engine soon be ruined.

er thing about oil: When this frozen—experimentally and with y—it formed a vaseline-like mass. water freezes something has to burst. should become cold enough to freeze it would still be safe.

I had the machine varnished this I took it entirely apart and could ry little evidence of wear. I shall y soon sell this reliable little fellow chase the new model, on account of ger engine and solid cylinder head. first thing I shall do is to set the oil vn against the cylinder, as in my old e. I am positive that this lubricating not feed through a little tube in eather. I have seen the little tubes n cold weather the oil cup must be-arm before the oil will drop from it n the nearer the drop of oil is to the r the surer it is to reach the cylinder eeded. That little, almost horizontal ll fill with cold, stiff oil and the cyl-will have to do without oil until the warms it up. Then in a physician's lls the engine seldom gets warm to melt oil out of a little tube above ery cold weather.

e way, the water must all be emptied he cooling coils before cold weather will settle below the cooling oil and A small quantity is sufficient to he circulation.

J. P. Hetherington.

sembling Built-Up Crank Shafts.

Horseless Age:

you kindly tell me through the col-of your valued paper a method for ling the two fly wheels and crank the many small motors having these nclosed in the crank case? In these each fly wheel has a portion of the haft attached to its centre, and when wheels are held together by the pin, the two portions of the main shaft must be in exact alignment. How to secure the last condition is what I wish to know.

David R. Chapin, M. D.

[If a large number are to be assembled, an open frame with bearings for the crank shaft journals should be used. First fasten the main journals in the fly wheels, put the crank pin loose in its sockets, put crank in the bearings of the frame and tighten nuts on crank pin. If a user wants to reassemble a crank, the best method, probably, is to put the crank together with pin loose; put it in the crank casing and draw the two halves of the latter far enough apart on the bolts to allow of tightening the nuts on the crank pin through the cylinder opening.—Ed.]

Police Traps in Massachusetts--Driver Must Be Identified.

Springfield, Mass., July 11.

Editor Horseless Age:

In view of the fact that automobilists in general, and local men in particular, are being "held up" by country constables in this vicinity, and thinking you might benefit your readers by sounding a warning note to those who contemplate driving in Western Massachusetts and Connecticut, I enclose a few newspaper clippings which will give you an idea of how the "land lays" in regard to the use of one of the most beautiful pieces of State highways in New England. The town of Russell, Mass., is the natural and about the only practicable gateway from Boston and Eastern Massachusetts to the Berkshires and New York State.

The "catch-penny" officials of that town have placed a sign near the Woronoco paper mill, in the village of Fairfield, limiting the speed of autos to four miles an hour and in another place to eight miles an hour, and there is danger of Westfield, the town next east, of adopting the same unreasonable regulation. The fact that the automobilists "won out" in this case is only making the town officers resort to more "tricky" methods, and it looks as though trouble was ahead for more than one unsuspecting traveler who happens to pass through this town. A little fairness on both sides, which has been the preaching of your paper for a long time, is the only remedy.

Enfield street, just over the Connecticut line from Springfield, is another fine piece of State road upon which they have police posted, but the "Nutmeg" officers appear much more fair than their Massachusetts brothers. However, this Enfield street is the natural route from New York to New England and a very large number of automobile tourists pass that way. They should be extremely careful after leaving East Hartford. One-of-the-Victims.

[The clippings referred to are to the effect that nearly a score of automobilists, mostly from Springfield, Mass., were recently arraigned in the district court at Westfield, charged with having exceeded the speed limit in the town of Russell on a Sunday early in June. All were discharged, because in most cases the complaining officer failed to identify the drivers of the vehicles alleged to have exceeded the speed limit, and in the other cases the evidence as to the speed maintained was considered inconclusive. One of the drivers identified was told at the time by Constable Copeland that his speed had been 45 miles per hour, but in court the constable gave the speed as 30 miles per hour. It was brought out by one of the attorneys for the defense that the stop-watch used in timing had not been cleaned for five years, and that the timing was done from Copeland's house, and not by persons at each end of the measured course.

Another clipping states that the Westfield selectmen will enforce a lower speed limit on Main, Elm and Franklin streets, and orders to this effect have been given to the Chief of Police.—Ed.]

Book on Road Laws Wanted.

Editor Horseless Age:

From the communication headed "Prospects of a Spite War" in your issue of June 11 last, I conclude that there are some peculiar laws and customs prevailing on the road, and that every one using a vehicle should be well informed on the subject. Can you tell me of some book that gives in concise form the latest on the laws, rights and liabilities of any one using the highways, say in New York State?

J. T. Fischer.

[We do not know of any such book; perhaps some reader does?—Ed.]

New Incorporations.

Automobile Depot, New York. Capital, $5,000. Directors: E. C. Griffith and P. M. Pelletreau, of New York, and W. H. Estes, of Brooklyn.

Motor Vehicle Transportation and Delivery Co., New York. Capital, $10,000. Directors: C. R. Ruckert, Bensonhurst; Charles Schmitt, Jersey City; C. R. Smoth, Brooklyn.

Antlers Automobile Co., Denver, Colo. Capital, $20,000. Directors: H. C. Colburn, Charles Emerson and E. A. Colburn, Jr., of Colorado Springs.

Salt Lake Automobile Co., Salt Lake City, Utah. Capital, $10,000. Officers, Thomas Homer, president; Charles S. Wilkes, vice-president; Elmer E. Darling, secretary and treasurer.

Hearing on applications for allowance of priority claims on the estate of the bankrupt General Auto and Mfg. Co. will be had at the office of the referee in bankruptcy, Society for Savings Building, Cleveland, O., July 13, at ten o'clock.

The Empire City Race Meet.

The fourth automobile race meet on the Empire City track, at Yonkers, N. Y., on Saturday last, July 16th, was interrupted by a heavy storm before half of the events on the programme had been run. The meet was well attended, both the grand stand and the clubhouse being crowded, but most of the occupants of the grand stand arrived late and saw only one or two events run before the rain put a stop to the proceedings. Contrary to the former custom, no cars were allowed on the lawn, but all were lined up under the grand stand and in the orchard, probably with a view to avoiding all risk of accidents to spectators.

The first event of the afternoon was a ten-mile open race for machines weighing from 881 to 1,432 lbs., of any motive power. Two prizes were offered, consisting of silver trophies valued at $100 and $50 respectively. Of the seven entries, five started and only three finished the ten miles. The starters were a 40 h. p. Decauville, a 10 h. p. Franklin, a 30 h. p. Renault, a 30 h. p. Christie and a 20 h. p. Mercedes. This event was won by W. Gould Brokaw's Renault, driven by M. G. Bernin. He finished seven-eighths of a mile ahead of the Decauville and lapped the Franklin, while Christie and Seymour had mishaps during the early part of the race and dropped behind. Bernin's time for the ten miles was 10 m. 13 2-5 s., which is a new record for light cars. All the intermediate miles, from one up, were also made in record time.

The second event was a special five-mile race for Franklin stock cars and saw all of the entries, five, at the start. It was won by Harry Esselstyn in 8 m. 49 2-5 s. Alfred F. Comacho was second, in 8 m. 51 1-5 s.

The next event to be run off was the second heat in a fifteen-mile free-for-all race for machines of any motive power weighing from 1,432 to 2,204 lbs. Although there were six entries, only three cars lined up at the start, viz., a 60 h. p. Mercedes belonging to A. G. Vanderbilt and driven by Paul Sartori; a 40 h. p. Decauville belonging to Guy Vaughn, driven by himself, and a 60 h. p. Mercedes belonging to Geo. Arents, Jr., and driven by Carl Mensel. Sartori, who held the pole at the start, got away quickest and continually increased his lead, doing some of the miles in 58 seconds. He lapped Vaughn in the eighth mile and finished the whole fifteen miles in 14 m. 40 s. The record for fifteen miles is 14 m. 21 s., made by Barney Oldfield at Denver last Fall. Mensel was second, in 15 m. 35 s. Vaughn picked up a nail and finished with a flat tire.

It had begun to rain just before the start of this event and continued to drizzle till the finish, when, at half-past three a heavy downpour started, which lasted until four o'clock, and as the track was then practically a river of mud, it was announced that the referee had decided that the race should be postponed until Monday afternoon at three P. M.

W. Gould Brokaw's Renault on the Empire City Track.

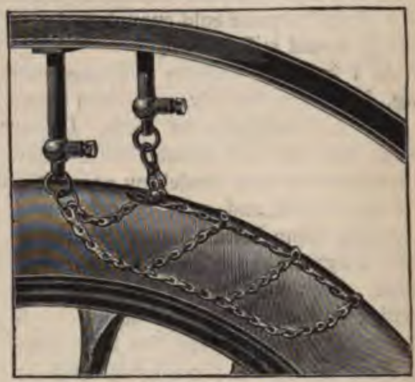
The unfinished events were run on Monday afternoon and were seen by an assemblage of about 1,400 spectators. The first events was the final heat of the fifteen-mile open race, which was won by A. G. Vanderbilt's 6$ h. p. Mercedes, driven by Paul Sartori. Time, 14 m. 44 2-5 s. Geo. Arent's 60 h. p. Mercedes was second, about seven-eighths of a mile behind the winner. Sartori continued, after completing the 15 miles, and established new records for from 16 to 20 miles, inclusive, the time for 20 miles being 19 m. 37 1-5 s. The previous record for this distance was held by Henry Fournier and was made on the indifferent Fort Erie track. It appears that Barney Oldfield has never driven over 15 miles.

The next event was a handicap race, which furnished some interesting finishes. Vanderbilt's Mercedes started on scratch and the greatest time allowance was accorded to A. E. Morrison's 24 h. p. Peerless, viz., 1 m. 40 s. The first heat of this race was won by Nathaniel Huggins' Decauville; the second by W. G. Brokaw's Renault and the final by A. E. Morrison's Peerless. In this race Vanderbilt's Mercedes car was disabled and had to be towed off the track. It appears that Sartori had neglected to fill the radiator, and the engine overheated to such a degree that the two forward cylinders burst.

Two record trials at one mile concluded the meet. W. G. Brokaw's Renault made a time of 59 seconds and Geo. Arent's Mercedes 59 2-5 seconds.

A New Nail Extractor.

A new nail extractor, or arrache-clou, herewith illustrated, has recently been placed on the French market. It is called the Tiger (on account of its ferociousness toward nails, the manufacturer says). The cut shows the construction of the device very plainly. It consists of a number of chains dragging on the tire and suspended from standards depending from the mudguard. The chains are of red copper, to prevent their rusting, and are of very substantial construction. It is claimed that they will extract all nails picked up by the tires, even if at the side of the tread, and that they will not jump from the tire under the vibration due to road unevennesses, and thus miss the nail. The device is adjustable as to height.



French Nail Extractor.

Motor Truck For Swiss Army.

The Swiss army equipment budget for 1905 contains an item of 15,000 francs for the acquisition of a motor truck with equipment and spare parts. It is explained that in view of the possible use of motor trucks in army service it is desirable to make practical trials and train a corps of mechanics in the handling of these vehicles.

Beconnais, a French professional automobile racer, and his chauffeur, Julien Bernard, met their death on Sunday, July 3, near Labouheyre, between Bordeaux and Bayonne, France. They were driving in a 100 h.p. Darracq racer at top speed, when the car began to skid and ran into a couple of big trees at the side of the road, killing the two occupants instantly.

MINOR MENTION

A garage and repair shop has been established at Mt. Vernon, Ohio, under the management of Ralph C. Vail.

J. M. Smelzer, of Anderson, Ind., inventor of a new automobile engine, is trying to interest capitalists to establish a factory in that town.

The New York Electric Maintenance Co. have moved into their new headquarters. 138-140 East Fifty-seventh street, formerly the Wanamaker station.

The Business Men's Association of Lincoln, Ill., is making efforts to secure for the place a projected factory for the manufacture of the "Lincoln" automobile.

The automobile owners of Anderson, Ind., are planning the formation of a club on the same lines as the one in Muncie, with which latter it may be consolidated.

Western Auto Supply Co., 285 Virginia street, Milwaukee, has recently been organized to manufacture a sliding change speed gear, a carburetor and an ignition timer.

The Autocar Co., Ardmore, Pa., have just broken ground for a new building adjoining their present factory, which when completed will increase their capacity 100 per cent.

The Seidler-Miner Electric Co., Detroit, Mich., have opened a garage and repair depot in a new building at 211 Jefferson avenue, next door to their electric supply business.

Owners of automobiles in Jacksonville, Fla., complain of a laxity on the part of the police in enforcing the ordinance against putting glass, nails, tacks and similar material in the streets.

The Tri-State Automobile and Sporting Goods Association, Detroit, have claimed as date for their next show the week immediately following the Chicago show, viz., February 13-18, 1905.

Many complaints have been made by automobilists concerning broken glass along the road through Bryn Mawr and Lower Merion, Pa., and the police on these sections have been instructed to arrest offenders.

The A. L. Dyke Automobile Supply Co., St. Louis, Mo., advises us that its capital has been increased from $25,000 to $40,000, and that it is now occupying its new building on Olive, Washington and Walton streets.

The Winton Motor Carriage Co. writes that the two automobiles built for the Signal Corps manoeuvers at San Francisco next August are the regular Winton two-cylinder touring cars, equipped with express wagon body and top.

At the meeting of the New York Automobile Trade Association last week, Hollender & Tangemann and the Standard Auto Co. were admitted as members. An application for membership was received from the Pope Mfg. Co.

The Dayton Electrical Mfg. Co., Dayton, Ohio, inform us that they are marketing the entire output of plugs of the Climax Ignitor Co., Amesbury, Mass., calling the new plug, which is considerably improved, the "magnetic ignition plug."

A party, including Mr. and Mrs. C. E. Wilkins, B. C. Russell and Louis Bostwick of Omaha, Neb., is en route from that city to New York in an automobile. From here they will go to Maine, returning home by way of St. Louis.

An automobile club has been organized by seventeen enthusiasts at Mobile, Ala., and the following officers have been elected: Geo. J. W. Whiting, president; R. C. Morris, vice-president; E. G. Hubbard, secretary; W. A. Blair, treasurer.

O. L. Judd, of Newark, N. J., who was private secretary to President Garfield, died at the Rhode Island Hospital, Providence, last week from injuries sustained in a collision between an automobile in which he was riding and an electric street car.

An automobile manufacturing concern, represented by F. Irving Dow, is negotiating with the authorities of Dubuque, Ia., with a view to locating there. The company, which is not named, is said to manufacture a $1,600 two-cylinder touring car.

Governor La Follette, of Wisconsin, proposes to make a political campaign through the State in a touring car, which is to be donated by friends. By this method the Governor believes he will be able to reach thousands of country voters who cannot be reached by railroad.

Captain Wm. Nash, of the St. Elmo Hotel in Denver, is reported to have invented a gasoline engine muffler of unusual efficiency, consisting of a hollow brass cylinder with several cones arranged inside, which divide the exhaust blast in such a manner as to obviate all noise.

The Curado Willow Ware Co. has been incorporated, under the laws of Pennsylvania, for the manufacture of automobile baskets. Capital $10,000. The list of officers are: Gottlob Hammer, president; A. L. Curado, vice-president; Charles Walters, treasurer; George Hammer, secretary.

The Milwaukee Automobile Club has decided to institute a test case to determine the constitutionality of the proposed ordinance for the licensing and numbering of automobiles. The mayor of Milwaukee has urged its passage, and the city attorney has issued a favorable opinion on the measure.

Coroner J. M. Blauvelt, of Passaic county, N. J., was recently presented with a bill for $96 for the use of an automobile from Paterson to Midvale on Sunday afternoon, July 10th, on the occasion of the railroad accident there. It took the coroner twenty-four minutes to reach the scene, thus making the charge $4 a minute.

St. Louis police commissioners have authorized the purchase of two high-speed automobiles, which will be stationed in the Forest Park section for use in causing the arrest of automobile speed violators. An experienced operator and a policeman will be in each vehicle, which will be provided with a speed meter.

The name of the Detroit Motor Works, manufacturers of Sta-rite ignition plugs and specialties, has been changed to the R. E. Hardy Co. The company was incorporated in 1900 to manufacture gasoline motors, but two years ago sold out its motor department, so that its name had become a misnomer.

The automobilsts of Martinsburg, W. Va., and nearby places have organized to fight the action of the Martinsburg and Winchester Turnpike Company in placing an additional toll of two cents a mile on automobiles and limiting their speed to ten miles an hour. Other pike companies are said to be considering the adoption of a similar plan.

The Auto-Traffic Company, of the East End, Pittsburg, which will engage in a motor bus service in that district, has received its first shipment of four cars, which will soon be put into commission between Edna and Allison Park. Plans for a storage house and repair shop to be erected at Craig street and Grand Boulevard have been drawn up.

The Bryn Mawr, Pa., Citizens' Association has taken up its cudgels for a stricter enforcement of the automobile speed law, which, it is declared, is being flagrantly violated on the highways that connect and diverge from Ardmore, Haverford, Bryn Mawr and adjacent towns. The association will move to have the speed limits reduced through these sections.

The executive board of the recently organized National Association of Engine and Boat Manufacturers met last Friday and elected the following officers: John J. Armory, of the Gas Engine and Power Co., president; H. A. Lozier, of the Lozier Motor Co., first vice-president; J. M. Schoonmaker of the Charles A. Strelinger Co., second vice-president; H. R. Sutphen, of the Electric Launch Co., third vice-president; J. S. Bunting, of the Smith & Mabley Co., treasurer, and J. Gambel, secretary.

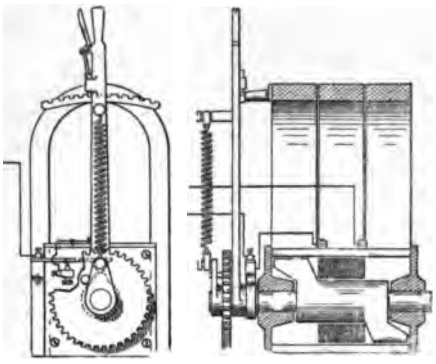
The Bronx Park commissioner of New York has granted a franchise to Walter Sutcliff to operate an automobile service between the Pelham avenue station of the Third avenue elevated railroad and points in Bronx and Pelham Bay parks. The excessive charges of hackmen to carry passengers to the Zoological park and the Botanical gardens have been a source of much complaint and influenced the park commissioner to grant the automobile franchise. The stipulated fare to either the "Zoo" or the Botanical gardens and return is ten cents. and the round trip to Pelham Bay Park may be had for 25 cents.

MOTOR VEHICLE PATENTS.

Patents.

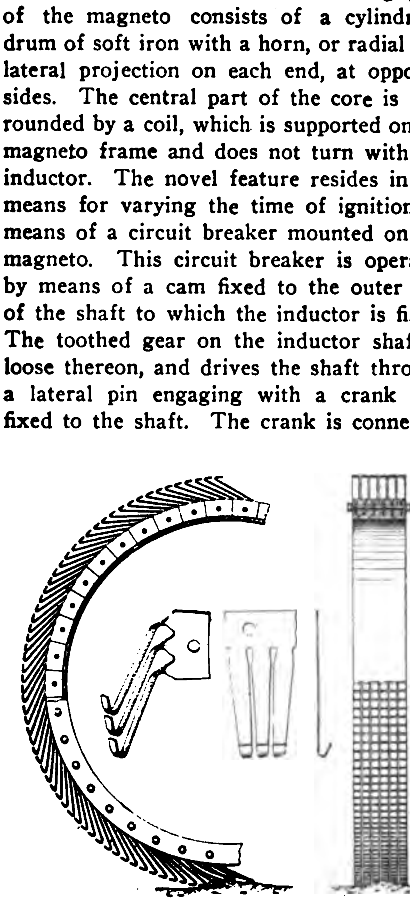
763,510. Magneto-Electric Generator. B. P. Remy and F. I. Remy, of Anderson, Ind., June 28, 1904. Filed March 14, 1903.

The invention relates to a magneto generator with stationary winding which can be connected permanently in circuit with the



No. 763,510.

ignition devices, thereby avoiding the necessity of conducting the current through either bearings or brushes, which are more or less liable to fail to properly conduct the current, due partly to the necessity for lubricants. The inductor or rotating part of the magneto consists of a cylindrical drum of soft iron with a horn, or radial and lateral projection on each end, at opposite sides. The central part of the core is surrounded by a coil, which is supported on the magneto frame and does not turn with the inductor. The novel feature resides in the means for varying the time of ignition by means of a circuit breaker mounted on the magneto. This circuit breaker is operated by means of a cam fixed to the outer end of the shaft to which the inductor is fixed. The toothed gear on the inductor shaft is loose thereon, and drives the shaft through a lateral pin engaging with a crank arm fixed to the shaft. The crank is connected



No. 763,536.

by a coiled spring to a long lever fulcrumed on the inductor shaft and adjustable on a toothed sector.

The action will now be obvious. During one-half of a revolution the gear wheel will drive the crank and the inductor shaft through its pin, extending the coiled spring. Then, when the crank has passed the position opposite from the timing lever, it is turned in advance of the gear wheel by the tension of the coiled spring, and toward the end of the motion under the influence of the spring the circuit breaker contact is opened and a spark is produced. It will be obvious that by moving the timing lever around its fulcrum, the time at which the spark occurs is varied, with relation to the cycle of the engine.

763,536. Tire for Vehicle Wheels. Joseph Alloatti, of Paris, France, June 28, 1904. Filed February 10, 1904.

This tire is claimed to have the same property of resiliency as the pneumatic tire, but to be free from liability to puncture, burst and side slip, which is inherent in the latter. It is formed of successive rows of elastic or resilient elements (steel plates) arranged on the periphery of the rim, each row being composed of several independent elements fixed side by side on a generating-line (which is common to all) of the rim and the rows thus formed fixed one behind the other on equidistant generating-lines sufficiently close together to allow of the elements of several adjacent rows being able to come simultaneously in contact with the ground.

763,996. Vehicle-Tire. Charles Motz, Akron, Ohio. July 5, 1904. Filed Dec. 7, 1903.

764,009. Rubber Tire. Edmund S. Roberts, New York, N. Y. July 5, 1904. Filed Nov. 16, 1903.

764,020. Electrically-Propelled Vehicle. Russell Thayer, Philadelphia, Pa. July 5, 1904. Filed April 11, 1904.

764,063. Driving Mechanism for Automobiles. Harry B. Maxwell, Rome, N. Y. July 5, 1904. Filed April 16, 1904.

764,091. Vehicle-Tire. Geo. H. Whittemore, Cambridge, Mass. July 5, 1904. Filed April 6, 1904.

764,113. Motor-Cycle. James S. Copeland, Hartford, Conn. July 5, 1904. Filed Dec. 18, 1903.

764,132. Detachable Flange for Rubber Tires. Cadwallader W. Kelsey, Philadelphia, Pa. July 5, 1904. Filed April 26, 1904.

764,140. Vehicle-Wheel. Thomas Midgley, Columbus, Ohio. July 5, 1904. Filed Aug. 19, 1903.

762,271. Carburetor for Motor-Cars, etc.—James F. Bennett and Hedley S. Moorwood, Sheffield, England. June 14, 1904. Filed March 23, 1903.

763,742. Variable Crank-Motion. Estelon E. Emerson, Willimansett, Mass. June 28, 1904. Filed Nov. 13, 1901.

763,819. Internal-Combustion Engine. Harry C. Waite, Milwaukee, Wis. June 28, 1904. Filed March 23, 1903.

Legislative and Legal.

William A. Tuttle, of Indianapolis, Ind., who was adjudged a bankrupt on March 29th last, has petitioned the United States District Court for a discharge.

Injunction has been sought against H. S. Moore, who keeps an automobile station on Crawford road, Cleveland, by a woman neighbor who alleges that the vibration and noise from the place are a source of annoyance. In addition to trying to have the shop moved or closed, the plaintiff asks $1,000 for damages to her property.

Fred H. Gordon, of Brockport, N. Y., was recently held to await the action of the Grand Jury in Albion, N. Y., on the charge of having refused to stop his automobile on a signal from Frederick M. Thompson, village attorney of Albion, who was driving a spirited horse. The local justice was without authority under the law to try the case.

A number of motor cyclists of Iowa have written to the Secretary of State for advilce as to how they are to comply with the new law requiring numbers a foot long and a red light on the rear of their vehicles. The manufacturers and dealers are also in doubt as to the necessity for registration of every vehicle in their charge, which the wording of the new law would seem to demand.

Police Traps on Long Island.

A party of three in a touring car were stopped by two officers of the law on Friday afternoon at Brookhaven, L. I., at the first of a series of dams followed by turns (familiar to automobilists), about half a mile west of the railroad station. They were told that they were under arrest on three charges: crossing a dam, crossing a bridge, and passing toward a curve at a speed greater than 4 m. p. h. The officers had measured off a stretch 165 feet long and claimed that the car had covered this in 9½ seconds, or at a speed of 11 to 12 m. p. h. A justice of the peace—John R. Vunk, J. P., of Bellport, three miles away—was on hand at a nearby grocery store and offered the driver the alternative of a trial by jury or a hearing before him, bail being required in the former case. An immediate hearing was chosen, and testimony was taken down in writing, which required 1 h. 20 m. Defendants claimed that they had slowed down before coming to the curve, but were convicted on a technical charge and fined $25.00. On their return they were met by another fellow wearing a badge, who warned them about officers, and in order to avoid any trouble the chauffeur was kept walking alongside of the car. It is stated that the police trap changes its location frequently.

At Islip, L. I., eight automobile drivers were fined $25.00 each and two motor cyclists $10.00 each last week. At Center Moriches, L. I., there have also been a number of speed arrests recently.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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THE HORSELESS AGE

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No Need of Spark Regulation for Racers.

Perhaps the most interesting feature of this year's Gordon Bennett cup winner, described elsewhere in this issue, is that it is without means for controlling the time of ignition while the motor is in operation. A car with fixed point of ignition would at first sight seem irrational for either racing or touring, as to obtain the maximum power from an engine at different speeds the time of the spark must be constantly varied in accordance with the speed. Probably the reasoning of the designer, which led him to do away with the spark control, is that the engine develops its maximum power at a given speed, and that in a race it should always be kept running as near this speed as possible by changing to a lower gear when the traction becomes so great as to pull the engine speed down considerably below that of maximum power. But if the engine is always kept running at within two hundred or three hundred revolutions of this speed, perhaps nearly as frequently above as below, it is better to permanently adjust the igniter to the most advantageous point for the speed of maximum power, as when the variations in engine speed are small, it is difficult to accurately follow them with the ignition lever, and the gain from attempts at ignition control becomes doubtful. Moreover, by dispensing with the ignition lever, the control of the engine is simplified and the chances of false manœuvres, which in a race prove so disastrous, are minimized. In a touring car, however, where the frequent need of gear changing would be very annoying, not only to the driver but to the occupants as well, it would be a great mistake to operate an engine without spark control, the more so as it would be very hard on the engine if the driver was not extremely careful to keep it always up to speed.

Murderous Minions of the Law.

After many threats to use guns to restrain speeding automobilists, mostly by incensed farmers, this method of "enforcing the law" was applied for the first time last week by a deputy sheriff on Long Island. The deputy who did the shooting is a very young man, almost a boy, and his rash act will probably bring him into trouble much more serious than that which now confronts several New Jersey officials. He has been unable to make out a case against the driver whom he charged with speeding, and the latter has been discharged by the judge before whom the case was tried, owing to lack of evidence. The details of the case are as follows:

On Sunday, July 10, John Foley, Jr., a New York business man, drove with a party of three friends in a touring car through East Main street, Patchogue, Long Island. A course was measured off along the road here, and passing automobilists were timed by Sherman F. Wickes, a deputy sheriff, and two assistants, James Buxton and Leonard Hill. When Foley came along in his touring car, his speed was taken by the latter two, who informed Wickes, stationed somewhat farther along the road, that it was beyond the legal limit, ten miles an hour. Wickes thereupon called to the automobilists to stop, and when they did not heed his orders, began to fire at the car with a revolver. Two bullets passed through the tonneau door and grazed the legs of the occupants, but no one was injured. Foley continued his way, but returned later to surrender himself and to lodge a complaint against the deputy. He claimed that his speed was not above eight miles an hour, and that he did not hear the deputy sheriff calling him to stop. The deputy, on the other hand, claimed that the speed was twelve miles an hour, and that in shooting he had aimed at the tires.

As this is the first case of the kind that has occurred, it will undoubtedly be carried through the courts with the special object of getting a judicial opinion defining the limitations of the prerogatives of police officials in arresting offenders of the automobile speed law. Not that there is any doubt whatsoever that there is absolutely no justification for an officer to fire a revolver at a speeding automobilist, but a decision rendered in an actual case of this kind would tend to familiarize the general public with the law on this point and prevent repetitions of its abuse.

Numerous decisions have been handed down defining the conditions under which an officer is justified under the law in shooting at an escaping offender. If an officer seeks to make an arrest without a warrant and kills a fugitive offender, he may be prosecuted as a common murderer, unless he is able to show that the victim committed a felony, and that his escape could not have been prevented by any other means. Violation of the automobile speed law, however, is not a felony, but simply a misdemeanor, and does not, therefore, warrant shooting even if all other means of apprehending the offender should seem futile.

The Patchogue deputy sheriff in emptying his revolver at the automobile committed an offense against the law, and it devolves upon the leading automobile organizations to see that he is adequately punished. That he aimed at the tires and not at the occupants will not absolve him from responsibility. In fact, the way the bullets hit the car shows that aiming at the tires is as dangerous as aiming at the occupants. Wickes is evidently a very dangerous person for the office of deputy sheriff and should be replaced by a man more deliberate in his actions.

Recklessness on the Bench.

Almost at the same time that a youthful deputy sheriff on Long Island shot at and imperiled the lives of a party of automobilists, this very method of dealing with speed offenders was recommended in court by Magistrate Cornell, of New York. If it had not been for the coincidence, the magistrate's rash and unguarded utterance would probably have been passed over with little comment and perhaps not even been taken seriously, but with a striking example of the possible effects of the recommendation furnished by the occurrence on Long Island, it has aroused much indignation in automobile circles and elicited condemnatory remarks in nearly every daily paper published in New York. If there is any place where the counsel, "Weigh well the meaning of a word," should be carefully followed, it is on the justice's bench, because we depend on the Bench for interpretation of the law, and any recommendation from that source would naturally be regarded by the majority of people as perfectly lawful. However, Magistrate Cornell's recommendation is entirely at variance with the law and incites to lawlessness and anarchy. One can hardly believe that a police court magistrate actually entertains the opinion that violation of the speed law justifies the use of deadly weapons on the part of the police, and the magistrate's ill-judged utterance can only be explained on the assumption that it was made in an unguarded moment and he was not conscious of its possible consequences. Such a blunder on the part of a magistrate deserves the severest condemnation.

Hints on Washing Cars.

Any means of reducing the depreciation in value of a motor car is worthy of the consideration of the motorist. In attempting to sell a used car, the owner soon finds that appearance has a distinct value, measurable in dollars and cents, and for this reason, and also because of the great personal satisfaction derived from the ownership of a well-kept car, it is desirable to preserve, as far as possible, the original high finish of the varnish and of the polished metal parts. To do this, the car must be washed carefully, as careless and improper washing may do as much to ruin the appearance of a car as neglect.

Before attempting to rub any dust or mud off the varnish, it should be gone over thoroughly with a stream of water from a hose without nozzle. If too much pressure is applied, there is danger of bespattering certain parts of the mechanism which should be kept dry, and also of scratching the varnish by driving small particles of sand over it too rapidly. When it is impossible to remove any more dirt in this way, a sponge may be used, which should be kept constantly soaked with water, by directing the stream upon it as it is moved over the paint. If there is a considerable accumulation of mud, as, for instance, after operating the car over dirt roads on a rainy day, the sponge should be carefully rinsed after each few strokes, so that there can be no danger of grit clinging to it. Every particle of dirt should be removed before the chamois is applied to wipe off the water which remains clinging to the varnish. The chamois should be carefully rinsed and wrung dry before it is applied, and should also be rinsed before the water which it absorbs in wiping the car is wrung out, in order to prevent accumulation of grit.

It is not considered good practice to use any sort of soap or hot water, as both tend to dull the finish of the varnish.

In the case of some automobiles, oil is likely to reach certain parts of the body or running gear. This should be removed with gasoline (if the water will not carry it away) before the sponge is applied. Great care should be taken that no oil or grease is touched by the sponge or chamois, as in that event it may be transferred to some other part of the car, thus still further injuring the general appearance. Furthermore, with a greasy chamois it is not possible to wipe the surfaces dry.

For certain cars, parts of which can not be reached with a sponge, a long, narrow back brush with soft hair filling is often found to be a handy instrument for removing accumulations of dirt. The brush should be used in the same manner as the sponge.

It is very bad practice to rub over the varnish with kerosene or any other oil, to make it shine, as in a short time the finish will be ruined, both because of the action of the oil on the varnish and because of the extra accumulation of dust upon the varnished parts, which is held by the oil and is not easily removed in washing.

Kerosene Burners.

The communication on the above subject in our last issue adds some rather interesting data to that already published, and it is not at all unlikely that the kerosene burner question will eventually be solved along the lines indicated by our correspondent. The rules laid down by him are not embodied in the Serpollet kerosene burner, as mentioned by a correspondent in the present issue, because the Serpollet burner is an ordinary multiple Bunsen burner. The principle of an enclosed flame for steamer burners was discussed in these columns about two years ago, but this is the first instance of success-

ful experiments in this direction on a car, so far as we know. This principle undoubtedly solves the problem of regulation of the fire without smoke and noise, but it would seem to involve a certain danger which is not present in the Bunsen burner. In the ordinary steam carriage gasoline burner of the Bunsen type the "gas" in the burner is too rich to burn without the additional air rising through the air tubes, and explosions of burners are therefore practically unknown. But with a burner taking all of its air around the fuel spray nozzle and therefore containing an explosive mixture, if the burner plate should be damaged by the heat, cracked or burnt through, it might allow the flame to light back into the burner and cause an explosion in same. Without the cooling effect of the air rising through the air tubes, the burner plate would undoubtedly be destroyed much quicker, thus adding to the danger of explosion in the burner. In view of this possibility, the use of the conventional type of burner of flat, cylindrical form would seem inadvisable in the application of the enclosed flame principle, as an explosion in such a burner would certainly ruin it and likely set the car on fire. The only type of burner that can be recommended for this purpose is that consisting entirely of tubes, and it is evidently advisable to make the construction as strong as possible.

Our reason for calling attention to this point is that undoubtedly experiments along this line will be taken up by some of our readers, and it seems well to warn them against this possible danger. A further discussion of this point would be desirable.

Street Accidents in London.

The following table gives the number of street accidents in London during the year ending May 31 last and is vouched for by the Home Secretary:

Cause.	No.	Persons injured.	Persons killed.
Motor cars	462	510	13
Motor cycles	120	130	4
Horses	332	337	8
Horse-drawn vehicles	7,327	7,584	190
Total	8,241	8,561	215

A storage battery trust has been formed in Germany by the acquisition of all stationary storage battery manufacturing plants by The Accumulatorenfabrik-Act.-Ges. Hagen in Berlin. The formation of the trust was preceded by severe competition and price cutting.

Cleveland Race Meet.

The third annual race meet of the Cleveland Automobile Club will be held at the Glenville Track on Friday and Saturday, August 19th and 20th. Entries close Wednesday, August 17th, with George Collister, secretary, 317 Superior street, Cleveland, O. Racing will commence at 2 P. M. each day, and the various events will be run off as follows:

Friday, August 19th: One hundred yard obstacle race; two miles for runabouts (stock cars); five miles manufacturers' challenge cup, Diamond Rubber Co.; two miles for electrics; five miles, open handicap, standing start (limit of handicap, ¾ mile); two miles motor cycle, open; five miles, open, for stock touring cars, stripped (class 1 and 2); record trials.

Saturday, August 20th: One mile open, in heats (class 1 and 2); five miles for electrics; five miles for touring cars with full road equipment—three passengers in addition to operator; ten miles, open handicap; five miles motor cycle handicap; five miles, open, for standard touring cars, regular stock models, stripped (class 1 and 2); ten miles open; record trials.

Cleaning Radiators.

The following instructions for cleaning radiators are given by Grouvelle & Arquembourg in *La Vie Automobile*: It is on the whole rather rare that incrustations are formed on the walls of radiator tubes, because this can only happen if the water arrives in the radiator at boiling temperature, which it should not. The conditions are entirely different with respect to the cylinder jacket, where the water frequently reaches the boiling point. To remove incrustation, it is advisable to force a weak solution of sulphuric acid through the radiator, not forgetting to carefully wash the radiator with pure water afterward, to remove all traces of the acid. More frequently than incrustations, precipitations are formed in the radiator, owing to impurities in the water. To remove these, it is generally sufficient to force a strong current of water through the radiator by means of a pump.

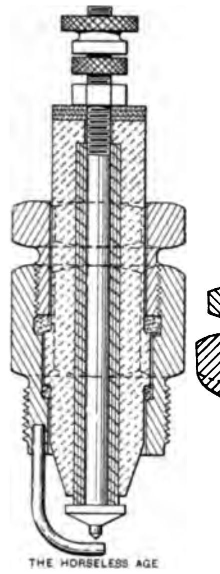
As regards the external cares that should be given to radiators, it is only necessary to repaint them when the paint has come off in places. Black paint or a dull grayish color should always be used for the purpose. In case the radiator is damaged by a collision and the driver is not a mechanic and has not the necessary tools with him to effect a repair, if the tubes are not completely closed up, it is generally best to continue the journey home as best he can, and then send the radiator to a repair shop, where work of this kind is done. A split or break in a tube may be repaired temporarily by means of red lead and rubber tape.

Spark Plugs--II.

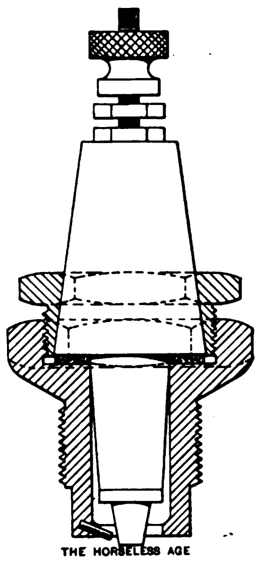
By Albert L. Clough.

The spark plugs manufactured by the American Coil Co., of West Somerville, Mass., are of two grades, known respectively as the "American Indestructible" and the "American Acme." The former is a solid, mica-insulated article of substantial construction, the mica being wrapped around the spindle and then mica washers assembled upon this to form the bushing. The "Acme" plug, which sells at a somewhat lower price, is insulated by means of a wrapping of mica about the spindle and a porcelain bushing of the ordinary kind, which fits over the mica. With this construction, it is claimed, the plug will not short-circuit, even should the porcelain bushing crack, as the mica shell would prove adequate insulation.

"Perfection" is the name given by the American Machine Mfg. Co., South Braintree, Mass., to the spark plug of their manufacture. This is a mica-insulated plug, having



Acme.



Canton.

the spindle wrapped with a conical serving of this material. The sparking end of the mica winding is the larger, and the shell is formed to receive its taper in such a manner that the gas pressure of the cylinder tends to increase the tightness of the joint. The shank insulation is of mica washers assembled around the insulated spindle under pressure. Square platinum discharge points of large size are employed, and the binding nut is provided with a set screw.

The Canton Automobile Supply Co., of Canton, Ohio, manufacture a plug with porcelain insulation, the insulator tapering conically in both directions from near its centre of length and a wide shoulder is formed by the base of the outside cone. A steel wire forms the spindle, and its inside end is formed into a substantial head provided with a blunt, conical sparking terminal. The head seats squarely against the end of the porcelain, and when cemented

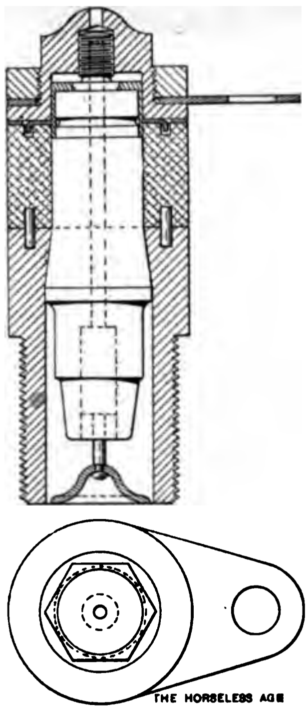
and drawn up the spindle cannot allow of any leak. The metal shell is very neatly finished and is formed internally to receive the taper of the porcelain rather loosely. Its end, inserted in the cylinder, is slightly flanged over and carries a short sparking point, which discharges to the end of the spindle. By slightly flanging over and thus constricting the end aperture of the shell, the surface of the porcelain insulation is very much protected from the effects of combustion.

An internal shoulder is formed in the metal shell, upon which is placed an asbestos packing with a thin copper washer over it. Upon this bears the shoulder of the porcelain bushing previously described, while a jam nut having a conical hole, fits internally the external surface of the porcelain outside the shoulder and screws internally into a thread in the shell. In this manner the porcelain shoulder is forced against the copper washer and a gas-tight joint formed, which cannot readily be blown out.

The taper of the inside conical portion of the porcelain is much steeper than that of the hole in the shell in which it is inserted, and there is therefore formed between them a free space, which is quite large near the discharge points and diminishes to nothing. The combustion can hardly be expected to penetrate into so restricted a space and the life of the porcelain, which is thick and heavily glazed, ought to be very good. The plug can be taken apart for cleaning without disturbing the packing.

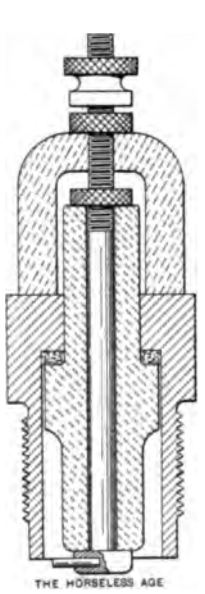
"Bougie Herz" is the name applied to the plug produced by Herz & Co., 55 Grand street, New York City. A lava or artificial stone bushing is employed for the insulation of this plug, and this material is claimed to prove far more durable than porcelain, while possessing in a full degree the insulating properties of that substance. Quite a deep annular chamber is formed between the spindle and the shell on account of the insulating bushing being rather short, and the spindle carries as its discharge terminal a disc of platinum alloy which almost fills the mouth of the shell. This platinum disc bears a small point upon its edge from which the discharge leaps to the edge of the shell. It is claimed that the discharge of gas from the chamber upon explosion, escaping through the narrow clearance between the terminal disc and the shell, sweeps away any particles which might otherwise cause a short circuit, and it is also held that the platinum disc, nearly filling the end of the plug, prevents the entrance of oil or carbon particles which might foul the end of the insulating bushing.

The "Sta-Rite" jump spark plug, manufactured by the R. E. Hardy Co., of Detroit, Mich., is of the porcelain insulated variety. The bushing proper, which carries the spindle, is provided with an external shoulder that engages with a corresponding internal shoulder on the shell. Being inserted from the cylinder end of

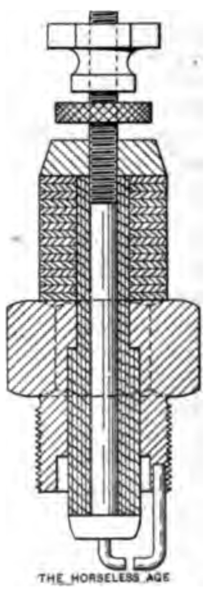


Bougie Herz.

the shell, and packing being provided between the engaging shoulders, the cylinder pressure tends to tighten the joint. The porcelain shank insulation is separate from the bushing, in order to prevent cracking from unequal expansion, and is in the form of a cup which is threaded over the outer end of the spindle and bears upon the shell with its edge. The plug is assembled by a lock nut which draws the spindle through the shank insulation, and at the same time pulls the bushing into gas tight connection with the inside of the shell. Space is left between the inside end of the bushing and the shell, owing to its being tapered, and a compression cavity thus formed to produce a "self cleaning effect."



Sta-Rite.



Comet.

A short, stout point affixed to the spindle end, discharges to the edge of the metal shell.

This company is also in the market with a new plug—the "Sta-Rite" No. 17, which is larger than the standard plugs generally employed. The manufacturers believe the larger size allows of more reliable and durable insulating qualities. In this plug a large solid block of mica, offering no edge surface to the gases and clamped by a steel ring is used for the bushing, and a porcelain cap is made use of for outside insulation.

The "Comet" spark plug, which is the product of the Oakes & Dow Co., of Boston, Mass., is of the mica insulated type, the bushing being built up of this substance with its laminae running lengthwise of the plug. A metal cap covers the end of the bushing, to prevent oil from working in between the ends of the laminae.

The Pittsfield Spark Coil Co., Pittsfield, Mass., manufacture a mica insulated plug, known as the "Jewel." The spindle of this plug is of solid steel, bearing a head on its inside end and a thread on the outside. The mica washers are assembled upon this stem, the whole mass compressed very powerfully by means of nuts and the mica is turned off flush with the protecting head in the inside and with the binding screw on the outside. The surface is then polished, rendering it so smooth that soot is not likely to lodge upon it.

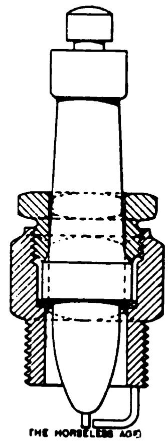
The J. C. Anderson Mfg. Co., of Jersey City, N. J., have produced a jump spark plug, which embodies a very novel feature designed to prevent accumulation of soot upon the insulation and also to prevent its being exposed to the heat of explosion. The plug consists of a long metal shell containing a comparatively short porcelain bushing, through which passes the long spindle. A packing nut holds this bushing tight in the shell, and a separate piece of porcelain, forming the shank insulation, is then applied. The object of making the insulation in two parts is to prevent breakage due to the different temperatures to which the two portions are subjected in practice. A long chamber is formed by the metal shell and the deeply recessed bushing. Through this chamber passes the spindle, which carries its contact point near the orifice. In the shell are two small diametrically opposite orifices which are just opposite the coned interior end of the bushing. These orifices are provided with inwardly opening ball check valves, and during each suction stroke of the engine these valves automatically open and deliver a small quantity of pure air in the vicinity of the end of the insulating bushing. When compression takes place, this air forms a protecting covering over the end of the bushing, while the charge fills the greater part of the cavity and is ignited near its mouth. In this manner, it is claimed, foul gases or oil never come in contact with the insulating surfaces nor does the flame of

the explosion, which might in time destroy the glaze of the porcelain.

Quite apart from the ordinary form of high tension plug, designed to be operated from an induction coil, is the Bullock "Special" vibrating plug, which is manufactured by the Bullock-Beresford Mfg. Co., of Cleveland, O. This device only requires to be screwed into the cylinder and wired in series with an ordinary dry battery and contact device. It contains within itself not only means for rapidly and continuously breaking the circuit within the cylinder, but also the self-induction necessary to give rise to a powerful and calorific discharge. The outside body of the plug is of steel and somewhat spool shaped, and carries a winding of bare copper wire carefully insulated. An armature is hinged upon one of the sides of this spool-like body and is held close to the other side in such a manner as to nearly complete the magnetic circuit. This armature, when in operation, gives a slight rotary motion to the movable electrode which projects through the plug end, sufficient to cause it to make and break contact with an insulated fixed electrode, and thus produce the igniting spark. The action is very similar to that which gives motion to the hammer of an electric bell or to the lighting mechanism of an automatic gas burner. Iridium-platinum alloy is employed for both electrodes, and if, after long usage, they become worn out, means for easily renewing them are provided. In this system no high tension current is necessitated and no apparatus required, other than the battery, plug and timer. In effect it is similar to the contact spark system, only that a multiple break is automatically accomplished without the need of any mechanical device.

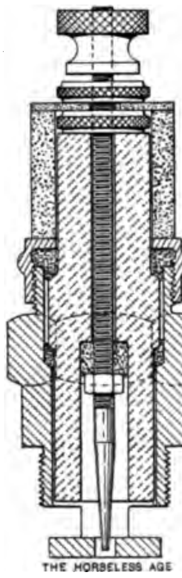
Quite similar to the last mentioned plug is the "Climax" ignitor, manufactured by the Climax Ignitor Co., of Amesbury, Mass. This vibrating primary current plug requires no coil, but merely a connection with the battery and contact device. It is claimed to be waterproof and to be suitable for high as well as low speed motors and applicable to air-cooled engines. The manufacturers advise reversing the polarity of the battery occasionally, as otherwise platinum is carried from one electrode to the other and deposited electrically thereon. By changing the direction of current flow, this action is equalized. The Climax ignitor is sealed by the manufacturers and is claimed to require no oiling or adjustment and to be perfectly gastight. Voltages up to 10 volts, derived from batteries or generators, are recommended.

In the T. G. I. 1904 spark plug, manufactured by the Torbensen Gear, Incorporated, of Bloomfield, N. J., a special effort is made to facilitate the replacement of the porcelain bushing in event of its becoming cracked, and it is stated that a new bushing may be inserted without removing the plug from the engine. The porcelain used is stated to be a special European importation, specially annealed. A conical form is given to the terminal end of the porcelain, which holds it away from the metal shell and tends to confer upon it "soot proof" qualities. Special clip terminals are furnished for flexibly connecting these plugs with the high tension circuits.

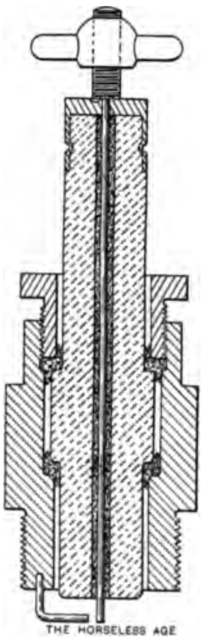


T. G. I.

Arthur R. Mosler, 1679 Broadway, New York, manufactures the "Spit-Fire" plug. This plug is porcelain insulated. The engine end of the metal shell is in the form of a hollow cylinder in the centre of the end of which is a small circular aperture in proximity to which is adjusted the discharge wire forming the end of the spindle. The spark thus takes place from the central wire to the edge of the central hole. Two large, circular, diametrically opposite openings are made in the side wall of the cylindrical end of the shell, and it is claimed that the free rush of expanding gas through these holes, clears the parts of oil, water of condensation and other deposited substances. Rather a deep cup shape is given to the cylinder end of the porcelain bushing, by which artifice, it is asserted, a quantity of inert gas is constantly retained in this cup-like cavity, so that no combustion and hence no deposition of carbon can take place upon the insulating surface, especially in proximity to the spindle. The central discharge terminal is capable of exact adjustment for spark length, thus avoiding the necessity of bending the wire, with the resultant danger of breaking it when rendered brittle by continual heating.



MOSLER.



SPLITDORF.

The Dow Portable Electric Co., of Braintree, Mass., manufacture a mica plug with sectional core—that is, the spindle is first insulated by mica wrapped about it, and then mica washers are threaded over this wrapping. The exposed end of the mica wrapping is protected against the entrance of carbonaceous material by means of a metal cap. Drawing up on the jam nut of the spindle, compresses the washers into a compact mass, and a packing nut secures tightness between the shell and the core. Either platinum, sterling silver or German silver points are supplied, at the option of the purchaser.

C. F. Splitdorf, 17 Vandewater street, New York City, manufactures both mica and porcelain insulated plugs. In the former, the spindle insulation, which is exposed to the gases, runs lengthwise of the plug, thus not presenting the ends of its laminae to the explosion. A protecting cap covers the end of the bushing. The shank insulation is composed of mica washers, strongly compressed and smoothly finished. Specially large, stout points are employed. The porcelain plug is insulated by a single bushing of special hard porcelain held in place by a packing nut and washer, in the usual manner.

In general, all plugs mentioned in the foregoing article are supplied in any standard size desired, and special sizes will usually be manufactured upon order.

One ignition accessory of interest in this connection is the "Spark Plug Tester," manufactured by the Newton Novelty Co., Fall River, Mass. This is a short metal tube provided with glass windows and having its ends capped. One end is tapped out to take the regular spark plug thread, and the other has inserted in it a common bicycle tire valve, with pump connection. When it is desired to test the sparking quality of a plug under conditions of practice, it is screwed into the hole of the tester and the joint made tight. A bicycle pump is attached to the valve and the pressure raised to about 50 lbs. per sq. in. If a good spark appears when the electrical connections are made, the plug is approved, but if not, it demonstrates that short-circuiting has taken place and the plug is rejected, although in all probability it would give a good spark in the open air. Testing plugs for electrical defects under pressure is the only certain method of discrimination between the good and the bad.

TOURING ROUTES

A View in the Catskills.

From New York to Chicago and Beyond.

By J. M. Hartshorn.

As so many will shortly be making the run from the East to St. Louis a few words from one who has twice toured from New York to and beyond Chicago may not come in amiss.

Last year I made the trip from New York to Oconomowoc, Wis., by way of Albany. This year I varied it, by going via Kingston and Binghamton to Buffalo.

We left New York Wednesday, June 22, at 7:15 P. M., in two cars, mine being a 24-35 horse power French touring car, and the other a 30 horse power American car. Crossing the 42d street ferry, we had a delightful run to Tuxedo (33 miles), reaching the club at 11 P. M., after a narrow escape on the way. Just a few miles before reaching Tuxedo, the regular road is being repaired and built up so as to cross the railroad bridge. A large sign warns people to take the other road, and a little farther along two posts are planted on either side of the road. In the darkness we did not see the sign, and the posts did not mean anything in particular to us. We soon came to an up-grade which was quite rough, and attempted to rush it, but had to change to slow speed. Just then some one called out, "For God's sake stop!" We did, and getting out to see what the trouble might be, I found that twenty feet ahead of us, just at the top of the grade, the road ended abruptly. The lamps of course could not show us this, as we were going uphill, and had it not been for the two young men who happened to be walking along there and saw our lights and shouted to us, we should have gone over the crest of the hill and dropped thirty feet, with what result may be readily imagined. As many others will soon be making this trip on the "St. Louis run" it might be advisable to put a bar across the road between the posts with a red light.

We did not get started the next morning until 11:30, as the other machine needed some adjusting, and we took advantage of the delay to have our tool box repaired, it having been broken the night before by backing into a good sized rock which guarded a gutter near Tuxedo Park.

A nice run of two hours brought us to Newburgh. After lunching, we started again at 2:30, arriving in Kingston at 5 P. M. From New York to Newburgh the roads were very good, but for several miles before reaching Kingston they were full of sharp stones, which cut the tires very badly.

The Lake at Tuxedo.

We had decided to run on to Pine Hill for the night, but as our aectylene generator was leaking we had to make a stop in Kingston to have it soldered. The other car kept on north to Saugerties and then west to Phoenicia, which an article in a recent number of an automobile magazine said was very much better, safer and quicker, though ten miles longer, than the road directly west from Kingston. While waiting for the plumber to finish his job, I had a little chat with the hotel keeper, and found that the direct road had just been made passable, so we made up our minds to take it in the hope of reaching Pine Hill soon after the others. We left at 6:30 P. M., and had a few miles of pretty poor roads, and a couple of miles which required very cautious driving, but from near Olive Branch there was a fine State road practically all the way to Pine Hill, which we reached at 10 P. M. We secured good rooms at the hotel and had a nice supper of coffee and ham and eggs (I strongly advise all automobile tourists to cultivate a liking for ham and eggs) and were on the point of telephoning to one of the towns the other car should have passed through, hoping to get news of them, when they arrived at 11:30. They were naturally

astonished, and then angry, to find us there before them, and, at first, thought we had sent them ten miles or more out of the direct way as a joke. To make matters worse they had lost their way and taken an almost impassible mountain road. However, after matters had been explained, they went in to get rooms, only to find there were none. They insisted that they had telephoned from Woodstock, where they stopped for supper, and to let us catch up, and that they had been promised accommodations. It then developed that the inn keeper thought we were the automobilists who had telephoned and had given us their rooms. Of course we offered to vacate, but didn't have to, as the landlord gave up his room to them.

Our lucky star was shining brightly that night, for when my man tried to take the machine around to the barn it wouldn't go. An examination disclosed the fact that the gasoline tank was absolutely empty! How pleasant if it had happened a few miles from town, and what luck that we should have just reached the hotel door.

The last twenty miles of the run to Pine Hill were delightful, and the scenery magnificent in the moonlight.

Friday we made only about sixty miles, as we did not start until noon, the other car requiring some repairs to its water pump, and my man putting straps in our rear springs to keep us from hitting our heads against the canopy top when getting bad bounces. Our car reached Delhi at 3 P. M., but had to wait there, as the other did not arrive until 6:15, the water circulation still giving trouble. Here our friends turned back for New York by way of Albany, having come with us about as far as they intended, and we went on to Unadilla, which we reached at 9:15. This is a very pretty place, and the hotel scrupulously clean.

A Stop to Take Out Kinks in the Legs.

Leaving the next morning, Saturday, at 8:50, we arrived in Binghamton at noon, and while we had luncheon had our first real repairs made at Whipple's garage. These were small, being some new and stronger hooks for the "make and break" springs and a new plug for the bottom of the gear case, ours having been damaged by striking a thank-you-marm. Leaving again at three, we reached Elmira at 7:45 P. M., having done 107 miles for the day, the roads being fair to good.

Sunday we made the longest run we had yet done. Starting at 9:55 we arrived in Bath at 12:45, and leaving at 2:10 reached Avon at 6:35 P. M. Here we had supper and filled the gasoline tank. Starting again at 7:35, we reached the Iroquois Hotel, Buffalo, at 1:10 A. M., in all 162 miles. The road from Dansville to Mount Morris, about 16 miles, was simply dreadful. It is clay and had dried in terrible ruts and ridges. Many of the ruts were from 14 to 20 inches deep, making the going very dangerous and slow. Fortunately we had got through without any accident, though if we had slipped into some of the ruts we should probably have broken an axle. Then to Avon, another 15 miles, the roads were of much the same character, though not so bad. From Avon to Buffalo we had a splendid run of 62 miles over fine roads. A gorgeous moon made everything so beautiful that we were really sorry to stop. We had our first, and, as it turned out, our only puncture about 35 miles east of Buffalo. We lost just one hour putting in a new tire, but didn't work very fast, being greatly entertained by the rambling and childishly profane talk of a drunken bicyclist who, wobbling over the crest of a hill into the glare of our headlights, promptly fell off. He asked if we had a flask, but under the circumstances we had none. I invited him to partake of a gasoline cocktail, but he declined, saying gasoline was about the only thing he wouldn't drink.

We stayed over the next day to visit Niagara Falls, and greatly enjoyed renewing our acquaintance with that famous place. One of my friends had to return to New York that night, so from there we were only three, one being my chauffeur.

We left Buffalo Tuesday morning at 9:15, reaching Westfield at 12:35. This 64

View of the Delaware River at Delhi.

Holding Up a Hay Motor for Repairs.

miles was done at the rate of 19 1-5 miles per hour, and as we had to run slowly out of Buffalo, seems to me very good time. As this was the fastest run we made on the trip, I now find myself having grave doubts when people tell me of their averaging 25 miles an hour in 10 to 15 horse power cars. Automobiling is perhaps gathering in its folds some former mighty fishermen!

Leaving at 1:40, we arrived at the Reed House, Erie, at 3:20, and starting again at 4:05 (can anyone guess what we stopped for?) reached Conneaut at 5:55, 125 miles for the day.

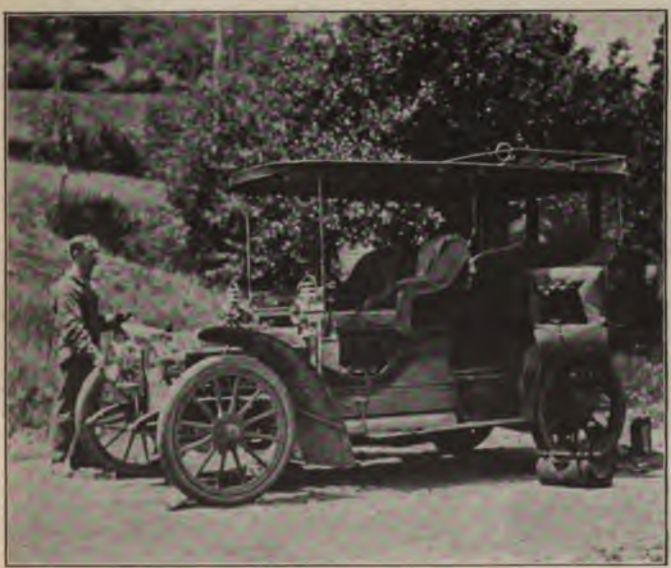
Wednesday we started at 9:25 and reached Oberlin at 6:35, having stopped at the Hollenden House, Cleveland, for our meal, in all 106½ miles in 7 hours and 5 minutes running time. Oberlin is not a very lively town after the college is closed, and I should advise pushing on to Norwalk, 22 miles beyond. We expected to run to Bryan (156 miles) the next day, but as it rained all night and until 7:30 Thursday morning, we had to give up the idea. The two main roads from Oberlin to Norwalk are clay, and were so greasy and slippery that we were in a great quandry as to what to do. A teamster, however, told us of a stone and sand road which took us past Norwalk to Bellevue. To get on this road turn the corner leaving the Park House, Oberlin, on the right hand; take first road to left (at corner of Park) and follow straight out for some miles, and then inquire about the turns. This road was poor for a couple of miles, but very fair the other 30 miles. Stopping to inquire, and having to retrace our way once for several miles delayed us, so that, although we left Oberlin at 9 A. M., we did not reach Bellevue (34 miles) until 12:30. Here we had our second narrow escape from a fatal accident. At the railroad crossing going into Bellevue we were obliged to stop as the gates were closed. After a freight train had passed they were raised and we started to cross. I should add that we were having a hard shower and our glass front was down and all the left hand curtains, so we could not see on that side. Well, just as we got on the first track some men standing on the farther side of the crossing waved to us to go back. The tracks spreading wide apart here, I stopped in between them, and a Pennsylvania train dashed by just ahead of us. Had it not been for this warning we should certainly have been run over. A miss is said to be as good as a mile, but hereafter I shall take a good look for myself even where there is a gateman.

We had a good luncheon at the Bellevue House, and leaving at 1:45, arived at the Boody House, Toledo, at 4:45. Ninety miles for the day in 6½ hours. The water here was so dirty that we didn't use the bath tub, but called for several pitchers of the spring water used for drinking, and sponged off in that. My friend very aptly nicknamed Toledo the land of darkness, the waiters being black, the water black, and the atmosphere black.

View of Delaware River.

Friday, July 1, we left Toledo at 9:45 A. M., reaching Kendallville at 6:25 P. M. One hundred and seven miles in 7 hours and 25 minutes running time. No mishaps of any kind, but innumerable stops for frightened horses, or rather, frightened drivers.

Leaving Kendallville the next morning at eight o'clock, we reached South Bend at 11:25, and, stopping there 20 minutes, got to La Porte at 1:02. Here we found that we had broken our tool box, which was hung below the body in the rear, and had lost two 910x90 inner tubes, fortunately old ones, and some tools. The proprietor of the Teagarden Hotel, where we lunched, very kindly took charge of advertising for them, and I still hope my reward may be claimed. Leaving there at 2:35 we reached



"Cleaning Up" at Pine Hill.

Dry Ford, Ten Miles West of Binghamton.

ditorium Annex Hotel, Chicago, at
. M. One hundred and sixty-four
and some 10 miles more that we
ut of our way), in 9 hours and 17
.

rife and son joined me here, and we
ll ready to start at 8:30 the next
g, but the machine wasn't. The
tor float had sprung a leak, and be-
iday, it was difficult to find a solder-
1.

nally got off at 10:25, and after a de-
ride along the lake front, over fine
reached Waukegan at 12:43. We
nice luncheon here, and leaving at
ached Milwaukee at 5:10. We had
ong the lake shore through Kenosha
cine, and while the views of the
ere pretty and the air deliciously
e sandy roads were quite heavy. I
ce been told that there is a fine road
back from the shore. No machine
15 horse power, however, need be
of the shore road, though fast time
urse impossible.

ng Milwaukee again at 5:45, we ar-
Oconomowoc at 7:30, 130 miles in
and 17 minutes running time, thus
ing the trip.

list of maimed and killed consisted
robin, which was overtaken in its
ght (it turned out to be a young
nd killed by striking the glass back;
n, one chicken and one snake. We
only one runaway, and that not seri-
. peddler's horse, standing unwatched
le the road, started to run after we
sed. He followed us a few hundred
hen choked on our dust and quit.

tween the two routes, via Albany or
gston and Binghamton, there is not
o choose as regards roads. In wet
both will be bad, in dry weather
ir to good. The scenery through the
s is, of course, much grander than
the Mohawk valley, though that,
very beautiful. We were favored
xceptionally fine weather this year.
st year the conditions were very ad-
I think, though, that after a spell of
should undoubtedly choose the Al-
ad.

country inns are fairly good both
ut those on the Binghamton route
better, probably because they have
number of summer visitors. Let me
conclusion that no well built machine
horse power should have any trouble
tiating either road under ordinary
r weather conditions.

Lieutenant Dudley, of Ireland, met
"brake" accident recently while on
mobile tour in Donegal. While as-
a steep hill the motor refused, and
kes were incapable of holding the
ich began to run backward down
ortunately the Lord Lieutenant had
e of mind enough to steer the car
the bank and all the occupants es-
ithout serious injury.

LESSONS of THE ROAD

The First Trip.

By a Newark Novice.

After having my car promised to me at a certain date and been disappointed three times, on the last Saturday in April, accompanied by two friends I went to the garage in New York, where the workmen were making the final adjustments on the machine, which up to that time had never been tested on the road.

The manager detailed a mechanic from the shop to accompany us out to Newark. We went down Madison avenue to 22nd street, then drove over to Third avenue, and passed down that thoroughfare with many narrow escapes to foot passengers. We finally reached the Staten Island ferry without mishap. On arriving on the other side and attempting to ascend the steep hill at Port Richmond the car ascended about half way and baulked. The expert who was with us claimed that the commutator was not properly adjusted. We were obliged to back down and take a fresh start, and by running on the low gears finally made the hill.

Our run across Staten Island to Elizabethport was mostly made with only one engine working, the other refusing to do duty, except at intervals. We reached Waverly without accident, when a policeman reminded us that we needed some light on the machine. We drew up to the first grocery and filled our lamps, all of which worked very well, with the exception of the tail light, which persistently refused to burn. We drove the car to my barn, and the trial trip was over. After a few general instructions from the expert, he took his departure, wishing me good success with my new car.

Sunday morning, after watering and oiling my new steed both internally and externally, I backed him out of the barn without any baulking, and drove him over to my machinist's house, and took the machinist aboard, thinking that it might be well to have a qualified mechanic along for my first trip under my own auspices. Also, having a friend who is an expert motor cyclist, I thought it well to take him along as an adviser, in view of my own inexperience. After picking them up, we started for Morristown. We ran up through "The Oranges," the machine working very nicely, then switched on our dynamo and were sailing along at about a twenty mile gait, when there was a click and a bang, and we parted with something, we knew not what, and the car came to a sudden stop.

Upon getting out and raising the bonnet, we found that the belt on the fan had become disconnected and the driving pulley of the dynamo had taken unto itself wings and flown off. The cotter pin in the end of the dynamo shaft had evidently been left out, and this omission had caused the trouble with the dynamo. We went back about 200 feet and found our clutch and the driving pulley of the dynamo, which after twenty or thirty minutes of hard work we got in place again, but not having any cotter pin we could not fasten it. This was about 10:30 Sunday morning, and exactly in front of the venerable Springfield church, a relic of the Revolutionary times, and the farmers who were arriving at that ancient place of worship were very indignant at finding a big five-seated tonneau planted in the middle of the road not thirty feet from the church. They demanded that as their unsophisticated horses were afraid to pass the machine, we should pick it up and remove it to the side of the road, but this being physically impossible, we firmly refused to comply with their request. We now had everything ready to run, except that we needed something to hold the dynamo pulley on the shaft. We finally induced one of the youthful spectators, to whom the attractions of the automobile were more potent than those of the church services, to get us a wire nail to serve as a cotter pin, which nail we finally forced into the small opening.

At this point we were confronted with a new difficulty, as in order to keep the nail in position it was necessary to bend the end of it. On account of the limited space this was very difficult to achieve, but in about half an hour we accomplished the feat. We then switched on the batteries, and the car moved ahead. We were then at the foot of a hill and turned on the dynamo. It worked—in fact, it worked too well, as we had to run on low speed in order to negotiate the hill. Then one engine refused to work, and we found a beautiful bunch of wax underneath the left-hand trembler blade of the sparking coil box which sealed it up as tight as a drum. Not knowing whether or not this was necessary, we stopped the machine and cut off the wax from the trembler blade. Meanwhile the small platinum point on the blade had removed itself. The current of electricity from the dynamo had been so strong that it had melted the silver solder on the platinum point, forcing us to run with one engine only.

All except the man who was running the machine got out and walked. After many trials and tribulations we arrived at Morristown and headed directly for a repair shop, which was located between a hotel and a store, leaving an alleyway with only a margin of a foot and a half on each side of the car. I drove the car into this narrow space (it being Sunday, they would not allow the front door to be opened), and we all alighted. The proprietor explained that he could not repair anything in the alley and it would be necessary to back the car up a runway into his shop. Our expert motorcyclist said that he could

put it there, and as he thought he had the engine on first speed, when in reality it was on second, and he had only five feet clearance in front, it made a sudden lurch and landed against a barn door with the left front tire smashing the door. I thought the car was gone, and had visions of buying railway tickets for the party home. He then reversed it, but had his foot on the emergency brake, and upon releasing said brake, the car took a sudden jump backward, this time into a fence, breaking the mud-guard and also a board in the fence, and in my mind's eye I saw a large repair bill. Fortunately, however, nothing but the broken mudguard and a few scratches on the tonneau resulted from this encounter. We shut off the power and by the united exertion of the whole party backed the large car into the shop by hand. It being five minutes of three,

"We began to feel, as well we might,
The keen demands of appetite."

We went around the corner into the Mansion House and found that we had arrived just before the hour for closing the dining room. After removing some of the grime from our faces, we sat down to a very good meal. From there we went around to view the machine once more. The platinum point having been soldered into the trembler blade and the sparking coil adjusted, after oiling up we started for home. Five miles from Morristown, while ascending a hill, the machine came to a sudden stop. After investigating everything that we know of, and finding nothing amiss, the thought struck us that we had not given the machine its dinner, and upon taking out the plug found that we hadn't a drop of gasoline. The numerous small boys who congregate whenever a machine breaks down were present, and upon inquiry we learned from one of them that the electric light station sometimes had a supply of gasoline on hand. And as it was necessary to go back to Morristown or get the oil at the station, we walked about a quarter of a mile to the said plant. The superintendent informed us that he sometimes had gasoline there, but thought he was out at present. After fifteen or twenty minutes search in an old shed he found a barrel containing ten or fifteen gallons of naphtha, of which he very obligingly sold us five gallons. We found that carrying five gallons of naphtha together with a heavy can and funnel in the hand was a much harder proposition than carrying the same quantity in the machine. We filled our tank from the can and giving a tip to a small boy who was standing by, we induced him to return the can and funnel for us. We then started once more for home. This time the machine ran all right, and we arrived home at dusk, hungry, dirty, tired and sleepy, but fairly well satisfied with our first attempt at automobiling. We had neither broken the engine nor punctured any tires, and after backing the machine into the barn we turned off the batteries and opened the stop cock over the cylinder, and run No. 1 was finished.

The Balking Buckboard.

By L. M. M.

Since disposing of our buckboard, we have owned two different machines, a second hand steam runabout, which we traded in for the buckboard, in order to familiarize ourselves with steam, and finally, a good steam machine chosen for its reliability. But, however many machines we may own in the future, we will never have another out of which we will get so much fun, exercise, and uncertainty to the square inch, as we did out of the buckboard.

The "buck" was also a second-hand machine, having been used for demonstrating purposes before we bought it.

Neither my husband nor I had even so much as ridden on an automobile before we bought the buckboard, but being a good all round mechanic, although a professional man, he was not afraid of the venture.

The "buck" came in in the latter part of October of last year, and on Sunday the 25th, after having owned it less than a week, we started on a trip to Jonestown, a village eleven miles away, to visit an uncle of my husband. All went "merry as a marriage bell," until we struck a long, gentle grade about a mile and a quarter out of town, where the supervisor had dumped about ten wagon loads of stone on the road, which he imagined he had previously crushed, and spread them out systematically from gutter to gutter. We struck this with a feeling of trepidation, which ended up in an explosion of sulphurous adjectives, modifying supervisors, roads and uncrushed stone, and when the "buck" finally refused to move another foot, we descended and pushed the thing to the top of the grade by sheer brute force. This was the first of many punctuations of this memorable trip. For about four miles the machine behaved beautifully, then we ran into a bunch of carriages, buggies and market wagons bringing home folks from early church service. Well, we were obliged to stop and wait for the entire procession to pass.

After the last team had vanished into the distance and we felt safe to start, my husband armed himself with the crank and took his position at the rear of the machine. One, two, three turns, and no response from the motor. He stopped to study the situation, and then discovered he had the switch-plug in his pocket. After placing that in position, he gave a desperate turn to the crank, and found he had oceans of compression, the recoil throwing him on the left hind mud-guard and snapping it like glass. However, we got started, and bowled along at a comfortable rate of speed, leaving the small, hilly village of Mt. Zion behind us, and after a few miles of winding roads through the most peaceful and beautiful scenery, we passed over the two covered bridges spanning the Swatara and one of its tiny tributaries, which transform this valley into a picture of loveliness. Turn whichever way you will, the horizon is marked by an irregular line of hills, of a deep rich blue. Directly in front of you is the Little mountain, at the foot of which lies the beautiful fertile Monroe valley. Off to the left is the Swatara gap at Inwood, where this romantic little stream runs between two majestic promontories of the Blue mountain, while the bed of the old Union canal, now being since abandoned, runs parallel with it, with the now almost obliterated tow-path between. Here, on Independence day, from a span of steel cable, one thousand feet in length, stretched from summit to summit, and drawn tight by the aid of a huge windlass, has floated "Old Glory" where it was discernible like a tiny speck in the sky, for miles unbelievable down the valley. Still farther to the left on a clear day may be seen Indiantown gap. While ever at your feet flows the Swatara, with its pretty Indian name, making the meadows fertile and beautiful to look upon.

We had been instructed to take the first road to the left after crossing the two bridges. This we found to be very narrow and not far from the main road, quite steep, and we both felt misgivings, which were quickly proved justified when we halted abruptly before a closed farm yard gate, upon one end of which the owner of the place was perched, while the hired man was mounting the other in an agony of terror. We apologized for our sudden and unannounced appearance, turned the machine about, and from this point finished the remainder of the trip to Jonestown without incident.

After a very pleasant visit and a light lunch, we started for home by way of Lebanon. Right here I learned a valuable little lesson which it were well always to bear in mind when touring with the aid of a gasoline machine of balking proclivities, and that is, not to say "Good-bye," until your motor starts. My husband turned the crank, and as I had previously seated myself and properly adjusted all my belongings, I called out a cheerful, confident "Good-bye." But as the machine did not move, I was obliged to hold my pose until it became tiresome and finally ridiculous, and eventually necessitated my casting about for a final topic of conversation to fill up the distressing interval.

When finally we did start, and I had reiterated my "farewell," my vow was irrevocably registered, never again to say "Good-bye" until I felt that motor pulsating with unmistakable intentions of taking me somewhere.

If we for a moment indulged in a fond dream of having left all our trouble in the

rear when we struck Jonestown, our dream was quickly turned into a horrible nightmare. Less than a mile out of town, my husband, who is a very conservative driver, and exceedingly chivalrous withal, brought the machine to a dead standstill to allow a young lady to pass with a very pretty bay mare. When the mare was within three feet of us we noticed that she was stone blind.

Before we had fully recovered from the shock of this episode, something loomed up before us in the distance, which sent our hearts in the direction of our boots, and caused all the mirth to shrivel up in our souls. It was a hill which seemed to throw up its lofty head into the very clouds, and whose plane seemed to rise at an angle of forty-five degrees from the level stretch across which we were approaching it. Our machine had a single gear and meant well, but intuitions counted for nothing in this instance. We got about one-third up the hill and there we stuck, and we knew we were in for it. We pushed the machine a short distance, then blocked her with stones, and then we looked at each other. There was sympathy in those glances; sympathy and pathos, and a mad desire for something to turn up.

This condition of affairs may have lasted quite fifteen minutes, when "out of a flurry of dust in the distance," like Bluebeard's brother-in-law, came two 'cyclists.

No Christmas tree loaded with dangling spheres ever delighted my eyes when a child, as did the sight of those two strong, healthy looking fellows, bent over their handle bars, with eyes fastened on the road before them. As they approached us they dismounted and pushed their wheels before them. It was a matter of only a very few moments until I found myself guiding one of the wheels up the hill, while my husband and the two giants, as they appeared to me, with the balking "buck" between them, made an interesting moving picture some twenty feet ahead. On reaching the top of the hill, we gave the machine a shove, and jumped her, throwing in the clutch and starting the motor half way down the hill. In this way we reached the next hill, and with the throttle wide open, went half way up.

Here again we were obliged to rely upon the services of our devotees of the pedal, to assist us in gaining the summit. After this we found the crank practically useless, and the only way we were able to start the machine at all, was by throwing in the clutch while coasting down the hill. At the top of the sand hill back of Lebanon, we stopped and waited for our 'cyclists, and having reimbursed them for their valuable services, we started for home, which was a distance of eight miles to the east. Again throwing in the clutch while coasting down the sand hill, we decided there must be no more stops, as our road from this point was practically level, affording us no opportunity of starting the motor with the aid of the clutch. We made but one stop, and that was on Lehman street, Lebanon, on a level cinder road, where for some unaccountable reason, the machine refused to move. We allowed the motor to cool for a few moments, during which time we removed the spark plug and cleaned it thoroughly, then finding that cranking was of no avail, we run about four ounces of oil into the crank case, and again failed to start the thing. After my husband had cranked until I imagined I noticed signs of approaching apoplexy, in sheer desperation I stood up in the machine, with one foot on the throttle, and off she started. In moving aside to allow my husband to resume his seat, I removed my foot from the throttle button, and the motor again stopped.

That throttle was a happy thought, and how we should ever have reached home without it, considering the loss of compression due to leaks and loose connections with which we were not yet familiar, I have no idea. Once more my husband cranked, while I held the throttle wide open, not only until we had started, but for the remaining seven miles of our trip, and despite our many difficulties, we arrived home just thirty-five minutes after leaving the sand hill, with faces swollen and burning from our fast run, and ravenous appetites.

The following day the motor was taken apart, and the three piston rings were found to be broken, in two, three and four pieces respectively, and how we ever reached home at all, with the consequent loss of compression, remains a mystery to this day.

Automobile Jacks.

The requisite characteristics of a successful lifting jack for automobile service are numerous, yet permit of wide variation in design. An automobile jack must be light, strong, positive in action, compact and so designed that its function may be performed with the least possible physical exertion on the part of the user. It must, further, have sufficient area of base to be steady under the car, to facilitate the attaching and detaching of tires, etc.

In nearly all the early attempts to construct portable automobile jacks, if the requirements were met satisfactorily as regards strength, positiveness and steadiness, the devices were objectionable on account of their weight and bulkiness, while those which were light and occupied a comparatively small space when not in use were in practice found to be deficient in strength and steadiness, these qualities having been sacrificed in order to obtain compactness. The jacks in the market to-day range from 3 to 8 pounds in weight and have a lifting capacity of from 1,500 to 5,000 pounds.

The reward which is awaiting the builders of really successful jacks is sufficient to have tempted a fairly large number of manufacturers, and the prospective purchaser has to-day a considerable variety to choose from. The mechanisms employed to produce a lifting movement may be briefly enumerated as follows: The rack and pawl, the rack and gear, and the screw thread and nut.

Fig. 1 shows the Springfield jack, made by the Shawver Co., of Springfield, Ohio. In this case a square-threaded member S moves into or out of the hollow base B under the action of the nut N, which rests upon the base and is secured to it by a shoulder and groove. By revolving the nut either with the hand directly or with the aid of a lever rod L, which is supplied and which fits into three sleeves formed on the nut N, the screw S, being unable to turn because of the locking action between its saddle-shaped end M and the axle of the car, is raised or lowered according to the direction of the motion given to the nut. When not in use, the screw is worked into the base as far as possible and the lever is slipped into a socket R, formed in the side of the base, and is held there by a locking set screw C.

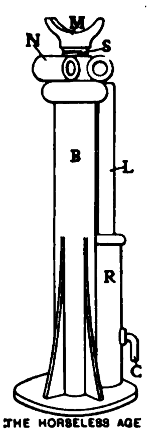


FIG. 1.

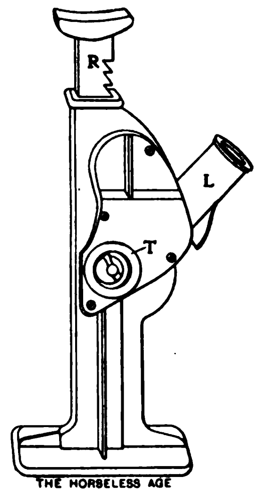


FIG. 2.

In the Barrett jack (Fig. 2), manufactured by the Duff Mfg. Co., of Pittsburg, Pa., the first mentioned principle is employed. A removable wooden handle fits into the socket formed in the end of the lever, L, and as this handle is moved up and down, a pawl attached to the inside end of the rocking lever so formed engages with a tooth in the rack R, thus raising the rack as the end of the handle is pushed down. An automatic locking mechanism is provided so that the rack is held at any position to which it is raised. To lower the car, a turn is given to the thumb screw T. The relationship of the rack and pawl is thereby altered, so that the pawl passes over the teeth on the rack while the handle is pushed down, and engages only when the end of the downward stroke is reached. At this point the locking mechanism is released, and it remains so until the end of the upward stroke is reached, at which point it once more engages.

In Fig. 3 is illustrated the Covert auto jack, a product of the Covert Mfg. Co.,

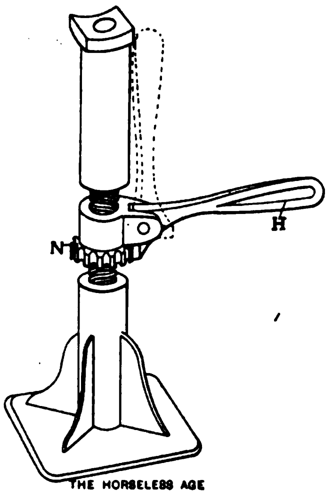


FIG. 2.

West Troy, N. Y. It furnishes an example of the screw thread lift, as it may be called. A right and left-hand screw engages with the internally threaded upper and lower portions of the upright column. A notched member, N. is secured to the screw, and the handle H, which is pivoted to the looose collar C, when in a horizontal position, engages with the notches in N. A rotary motion can accordingly be given to the screw in either direction and a movement of the handle one way will, therefore, raise the car, while a movement the other way lowers it.

The mechanism of the Sta-Rite jack, made by R. E. Hardy Co., of Detroit, Mich., consists of a special gear and rack combination. The top of the ram can be quickly brought up beneath the axle by turning a hand wheel, and the axle is raised by an upward and downward motion of a handle.

The Cinderella jack (Fig. 4) of the Jersey Brake Co., Newark, N. J., operates on the general principles of a rack and pawl. It is so designed that it can be operated by a downward pressure of the foot upon the pedal P. The ram R can easily be extended to meet the axle by simply pulling it out. The jack folds up very compactly, 'is very light, and can be operated from a standing position.

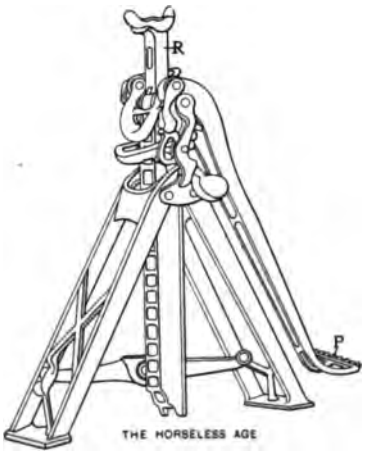


FIG. 4.

In the jack manufactured by the Kenosha Jack Mfg. Co., of Kenosha, Wis. (Fig. 5), we have a combination of the gear tooth rack, spur and worm gear to secure the upward movement of the lifting part or rim. The squared end of the handle H (shown detached) fits into the square hole S, formed in the center of the worm gear W. As this handle is twisted around its centre line, the worm gear gives to the spur gear A a rotary motion, which is transmitted by the shaft X to the gear B, and is converted to motion in a straight line up or down, as the case may be, by the engagement of the teeth of this gear with those of the rack R. As the worm gear is irreversible, it provides an automatic lock for all positions of the rack.

Besides those mentioned above, the following firms are directing at least a part of their attention to the manufacture of auto-

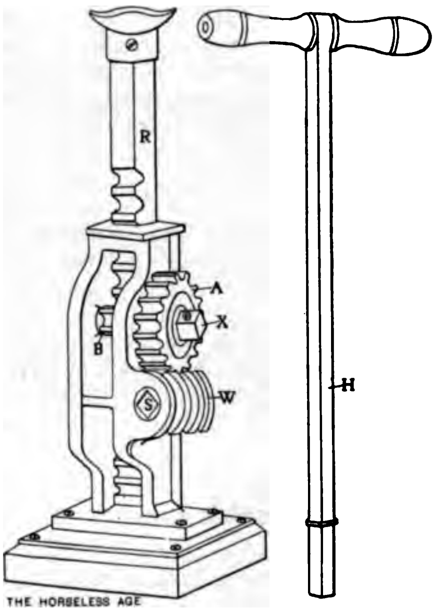


FIG. 5.

mobile jacks: Smith-Hemenway Co., 296 Broadway, New York City; Wm. J. Lockhart, 24 Beach street, Boston, Mass., and Merrill-Stevens Mfg. Co., Kalamazoo, Mich.

An Anti-Leak Amalgam.

An amalgam, very convenient for stopping up holes that cannot be soldered easily, is made of the filings of an alloy of zinc 66 per cent. and tin 34 per cent., kneaded with quicksilver in the hand into a stiff dough, squeezing out all the mercury possible. This amalgam should be pressed when first made into the cavity and allowed to harden. When hard it may be scraped or filed like the metal itself.—*American Machinist.*

The Acme Motor Car Co., Reading, Pa., are bringing out a runabout with a single cylinder upright motor in front and sliding change speed gear.

Additional Entries for St. Louis Tour.

The following formal entries have been made for the St. Louis Tour since the list, published last week, was printed:

Webb Jay, Cleveland, Ohio; New York to St. Louis.

H. H. Franklin Mfg. Co., Syracuse, N. Y.; New York to St. Louis.

W. B. Saunders, Philadelphia, Pa.; Philadelphia to St. Louis.

Dr. W. J. Martin, New York City; New York to St. Louis.

Frederick R. Tibbitts, Boston, Mass.; Boston to Buffalo or Chicago.

James M. Waters, New York; New York to St. Louis.

Percy P. Pierce, Buffalo, N. Y.; Boston to St. Louis.

A. T. Keeley, Royers Ford, Pa.; Royers Ford to St. Louis.

F. Ed. Spooner, New York City; New York to St. Louis.

F. C. Gates, Cleveland, Ohio; Cleveland to St. Louis.

Harold L. Pope, Hartford, Conn.; Springfield, Mass., to St. Louis.

Mrs. Susan D. Malpaas, New York; New York to St. Louis.

Guy Stone, New Orleans, La.; Cincinnati to St. Louis.

Swinehart Clincher Tire and Rubber Co., Akron, Ohio; New York to St. Louis.

Dr. W. H. Gifford, Cleveland, Ohio; Cleveland to St. Louis.

A. L. Pope, New York City; New York to St. Louis.

Black Diamond Auto Co., Utica, N. Y.; New York to St. Louis.

Calendar of Automobile Dates and Events.

July 29—St. Louis Tour (Syracuse to Rochester).
July 30—St. Louis Tour (Rochester to Buffalo).
July 30—Newport, R. I., Race Meet.
Aug. 1—St. Louis Tour (Buffalo to Erie).
Aug. 2—St. Louis Tour (Erie to Cleveland).
Aug. 3—St. Louis Tour (Cleveland to Toledo).
Aug. 4—St. Louis Tour (Toledo to Waterloo, Ind.).
Aug. 5—St. Louis Tour (Waterloo, Ind., to South Bend, Ind.).
Aug. 6—St. Louis Tour (South Bend, Ind., to Chicago).
Aug. 8—St. Louis Tour (Chicago to Pontiac, Ill.).
Aug. 9—St. Louis Tour (Pontiac, Ill., to Springfield).
Aug. 10—St. Louis Tour (Springfield to St. Louis).
Aug. 19 and 20—Glenville Track Races, Cleveland, O.
Oct. 8—Vanderbilt Cup Race.

)MMUNICATIONS

ie Delivery Wagon Wanted In Sweden.

STOCKHOLM, July 8.

HORSELESS AGE:

you kindly furnish me with the ad-
; of the manufacturers who are turn-
t (1) the best automobiles for loads
)0 to 3,000 kilos, and (2) the best
)biles for loads of about 500 to 1,000
:o be driven by petroleum, benzine or
:e, not electricity or steam. I am
; for the agency for delivery wag-
; above of really good construction,
; neat as possible, considering the
ιey are intended to carry. Knowing
, be well acquainted with the auto-
industry in your country, I have
ιt fit to write you and hope that you
ndly give me the addresses asked for.

FRITZ SCHMIDT.

nent Expansion of Metals by Heat.

DJOCJA, ISLAND OF JAVA, June 9.

HORSELESS AGE:

:end to have built a vertical heat mo-
new design, and wish to take all
able precautions to avoid, as far as
e, trouble from uneven expansion of
rts when they become heated. Ac-
gly the cylinders are cast separately,
ιt water jacket, and are merely plain
:arefully bored out and machined on
tside to an even thickness. They are
ιetween the heads and the crank case
ιns of long bolts. In this way equal
ιion is insured for all parts of the
:r wall in the same horizontal plane,
ed the heating and cooling effects are
n at all points of such plane, which
ertain. Moreover, the heating effect
ιter near the cylinder head than at
ver portion of the cylinder. On this
t, and owing to the desirability of
all parts affected by temperature
s as little as possible, I have con-
l the possibility of lessening the ex-
n of the pistons, the cylinders and
ιads, by heating and cooling them
.tely before machining. Experiments
x and others have shown that there
onsiderable permanent expansion of
on when submitted to alternate heat-
ıd cooling. Brix observed that a
bar of 1.1 meters measured 1.1212
after 30 days' use, and thereafter
was no perceptible permanent ex-
n. This leads me to ask whether a
of cast iron, after having been heated
certain degree, and cooled, several
in succession, until no more perma-
xpansion is caused, is less affected by
ature changes, i. e., expands and contracts less for a certain temperature variation that it did before? If so, it would be advisable to subject the cylinders, heads, and pistons of internal combustion engines to several alternate heating and cooling processes, before machining them. It would, of course, not be practicable to subject them to high temperatures, as this would lessen the resisting power of the material, but there is no objection to heating them to about 700 deg. Fahrenheit.

I would like to have your opinion on the matter, and hope that you will kindly advise me through the columns of your valued paper.

A. F. VAN AMSTEL.

[We do not believe that the coefficient of thermal expansion can be reduced by this treatment. No such effect is mentioned in any of the textbooks on iron and steel with which we are familiar, and it is not usual to apply any such process to cast iron cylinders of gas engines.—ED.]

Kerosene Burners--Dreams that Come True.

Editor HORSELESS AGE:

In your issue of July 20, Mr. Bard refers sarcastically to my article on kerosene burners in the issue of July 6, characterizing his own valuable article as an epitome of "actual facts" and not a "theoretical dream." Will you kindly do me the justice of acknowledging that my article, as written by me, began with the admission that the writer had never seen a kerosene burner at work. This statement was made so that the reader would know that the article was only a presentation of logical deductions, or, if you please, a "theoretical dream." The copy-reader struck out that important admission. He also struck out a reference to one of Mr. Lucke's experiments at the Columbia University (probably because it was mentioned as "the only conclusive one of the series"—as if that were a reflection on the experimenter's ability) which supported Mr. Bard's favorable judgment in regard to red-hot generators and the Walker system (which comes under that category) as well. He also inserted a reference (with illustration) to the Simmons' "Blue Flame" burner, which I had not mentioned with a word, because in my opinion it presented no clear case, and the mention of it was therefore out of place in a "theoretical" article.

It now so happens that my article, which was written upon request and was not intended to be pretentious, did exactly all that could have been expected of it. It elicited the valuable information from C. W. M. in the issue of July 13 that an engine actually exists, which, though crude in other respects, gets good results by employing extraordinarily energetic atomization of the fuel by a "ram valve"; whatever that is. And it also elicited Mr. Bard's communication, which confirms all the other "'theoretical" deductions, or rather probabilities, presented by me, and which would have appeared more clearly if my article had been left as it was written. As to Mr. Bard's "actual fact" discoveries, they seem to me to be about identical with the Serpollet system, but I trust this impression is due only to hasty reading.

Will you permit me to suggest that a little tolerance toward the words and spirit of signed articles would not be a bad feature to add to the other excellent qualities of the HORSELESS AGE, and to remind your readers and the many fortunate contributors who have opportunities to make experiments, that it is not a bad thing, either, to have someone in this field of automobile technique who will expend as much energy in plodding logical examinations as they are privileged to expend in practical experimenting and demonstrations. The value of theorizing depends solely upon its quality, and this includes that the theorist be permitted to make no "better front" than he knows he is entitled to. In several recent writings I have emphasized the limit of my knowledge—for the benefit of the reader—but editors have invariably blue-penciled such admissions. They seem to want all who write for them to appear as "authorities," at all hazards. The undersigned lays claim only to that capacity for critical reasoning which is sometimes supposed to be the special faculty of the jurist, and which consists in determining what conclusions are justifiable and what inferences are fairly admissible from given premises. Combined with complete willingness to admit all limitations of knowledge, I believe this faculty is sufficiently rare to be of special value.

Perhaps you and your readers will admit that the utility of many of the contributions to your valued columns, especially those from physicians, depend more upon what the authors possess of this quality—which I recommend to your further fostering care—than upon their expertness as mechanical engineers, and I feel convinced that these remarks upon the subject will strike a sympathetic cord among many of them, for, after all, the users of automobiles are not as cynical as is, perhaps, the industry.

M. C. KRARUP.

Some Steam Experience.

Editor HORSELESS AGE:

Having had three years' experience with a steam runabout, I thought perhaps a part of my experiences might benefit some readers of the HORSELESS AGE. In August, 1901, I purchased a single-seated carriage of a standard make equipped with a fire tube boiler with copper tubes. I had my worst trouble the first two years, my block chain being so light that it would constantly keep jumping off when running fast. I also learned that I could run 10 miles on one gallon of gasoline by making 10 miles an hour, while if I ran 15 miles an hour I

could only run 8 miles on one gallon of gasoline. My first single tube tires were too thin to stand much usage, and gave me a great deal of trouble. I tried introducing an inner tube into them, with very poor success. I find the boiler is too small to keep up steam pressure for heavy hill climbing. As for accidents, I have had all kinds, such, for instance, as carrying gasoline along and getting it on fire. I had it run back down a short steep hill and upset and catch fire. I put out the fire by putting dirt on it. My expense bill has been five cents for every mile traveled. A great part of my accidents were caused by too fast running and carelessness in handling the carriage. We have a great deal of sand in this part of Nebraska and I find it very slow traveling.

I have run my old carriage over 3,000 miles, and with the exception of the boiler scaling, I get just as good service as when she was new. With the old carriage it is almost impossible to hold a good gauge of water in hill climbing. With the new carriage, which has a water tube boiler, I have no trouble. I can climb any hill that a team can draw a load up, if the hill is smooth.

W. R. PENNINGTON.

Comparative Expense of Gasoline and Steam Cars.

Editor HORSELESS AGE:

Will you kindly forward me a paper containing an article on the comparative cost of maintenance of gasoline and steam automobiles, if you have published any of recent date?

Is there any good reason why gasoline cars should not have ball bearings on the main shaft? Is there not more wear to a gasoline car as now constructed than a steam car, and how much oil and gasoline will each use (8 h. p. runabout)?

When I notice the number of steam cars now run by 6 to 24 h. p. gasoline men, I begin to think that there must be a cause for the change, and I am interested to learn if the same tendency prevails in other locations. I suppose our steam friends have their troubles, but if greater than those caused the gasoline man by clutches, carburetor, valves and spark plugs, they surely must enjoy and benefit by the "King of Sports" (as I have during 3,000 miles in '04), or they would not continue in the auto line.

The manufacturers are probably the cause for the change; they should give us more inside the car and pay less attention, if necessary, to the exterior. Give us some bearings, clutches and valves that do not wear out the first 2,000 miles, and if that carburetor was "adjusted at the factory," give us some that have not been.

I would thank you for any information on the many questions. S.

[It is impossible to make an accurate comparison of the cost of maintenance of gasoline and steam automobiles, as in any individual case the expense depends much more on the construction of the car and the care it receives than upon the power system employed. A steam car always consumes more fuel than a gasoline car of equal power, but as the cost of fuel is only a comparatively small item in the expense account, this does not by any means determine the total cost of operation.

There is no reason that we know of why gasoline cars should not have ball bearings on the rear axle, and quite a number of the latest cars are fitted with them. At the same time the opinion of either manufacturer or old experienced users, as to the advantages of ball bearings, is by no means unanimous.

We have not published any article comparing the expense of operating steam and gasoline cars.—ED.]

Philadelphia to Delaware Water Gap.

Editor HORSELESS AGE:

Kindly publish in your next issue the best automobile route from Philadelphia to the Delaware Water Gap or Stroudsburg, Pa. F. KRAUSS.

[Probably the best route between these two points is as follows: Philadelphia, Nicetown, Ogontz, Jenkintown, Willow Grove, Doylestown, Pipersville, Kintnersville, Neigelsville, Easton, Martin Creek, Richmond, Delaware Water Gap. The distance is about 75 miles. The roads are from fair to good.—ED.]

What the Trouble with the Cycle Motor Was.

Editor HORSELESS AGE:

After reading your reply to my letter, published in issue of June 29, relating to the power of my cycle motor, I began one or two experiments on it. On the bottom end of the exhaust valve rod I put a cap of brass 1/20 of an inch in thickness, thus increasing the lift of the valve that much. This made a noticeable difference, but not as much as I hoped for, so I set the exhaust valve gear back one tooth. The motor is now about 35 per cent. more powerful than it was before. It will climb hills at a fast clip which it would never "look at" before I made the change.

I took the motor apart to-day to repack it, as it leaked oil considerably, and while doing so I noticed that the inlet valve spring looked rather large and heavy for such a small motor, so I tried one or two experiments on that. It took a weight of 12 oz. to overcome the pressure of that spring, exclusive of weight of valve. Is that too much? If so, what size of spring to use? Would the stiffness of the spring greatly affect the power of the motor? As I said before, it has increased wonderfully in power and speed, but I think there is more power yet to be gotten out of it, as it will come nowhere near equaling the performance of the motors which you mentioned. I thank you for information received from your valuable paper, and I will write again later on and let the readers know results of further experiments.

S. A. HARDING.

[Yes, the spring seems to be too strong. Experiment will best determine the most advantageous pressure.—ED.]

Motor Cycle Contest Awards.

The report of the referee and committee in charge of the Six Days' Endurance Contest of the Federation of American Motorcyclists, held July 2-7, shows the following awards:

For the Complete Series, comprising all tests and the run from New York to Albany and return, and from New York to Cambridge, Md. (highest possible score 1,317 points): Diamond medal to Geo. H. Holden, Springfield, Mass. (1¾ H. P. Indian), 1,310 points; silver medal to Fred C. Hoyt, Springfield, Mass. (1¾ H. P. Indian), 1,309 points; bronze medal to Oscar Hedstrom, Springfield, Mass. (1¾ H. P. Indian), 1,308 points. For the First Series, comprising all tests and run from New York to Albany and return (817 points possible): combined gold and silver medal to Geo. B. Piper, Brooklyn (1¾ H. P. Indian), 772 points. For the second series, comprising all tests and run from New York to Cambridge, Md. (817 points possible), combined gold and silver medal to J. M. O'Malley, Hartford, Conn. (2¼ H. P. Tribune), 792 points. The committee states in its report that the remarkable results achieved by the competitors furnish convincing evidence that the motorcycle must soon find a secure place in the social economy of the world.

The "Battle Against Dust."

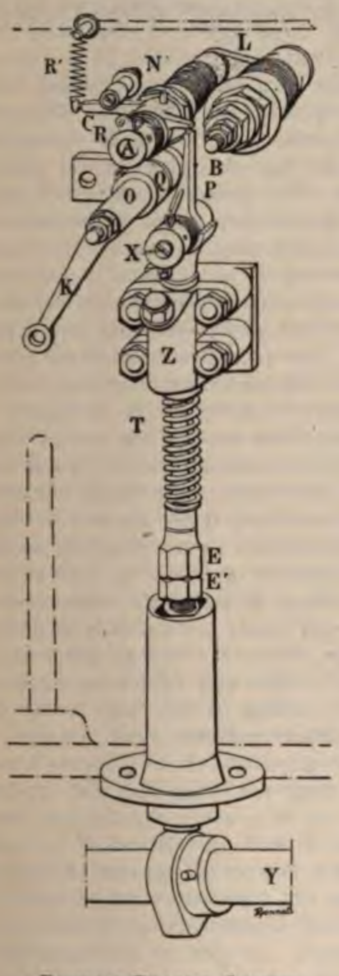
A new system of road tarring, said to possess superior merits both as regards efficiency and economy, has recently been brought to public attention in France. It is due to Mr. Girardeau, county surveyor of Fontenay-le-Comte (Vendee). With this system, it is claimed, the tar penetrates into the roadbed, thus increasing the life of the tarred coating. The amount of tar used is one kilo per square meter, or nearly 2 lbs. per square yard. Mr. Girardeau has published a small brochure dealing with his system, which may be obtained from the Touring Club de France, Ave de la Grande Armee, Paris, at one franc.

Our French contemporary, *L'Automobile*, has opened a subscription for the benefit of the mechanics on the three French cars in the recent Gordon Bennett race, Muller, Lumbach and Miolans.

OUR FOREIGN EXCHANGES

The Richard-Brasier Cup Winner.

The vehicle with which Thery won in the recent Gordon Bennett race weighs 2,090 lbs. empty, but with horn, accessories, etc. It maintained an average speed of 99.416 km. (61.8 miles) in the French eliminating trials and an average of 88.050 (54.7 miles) in the Gordon Bennett Race. It will develop a maximum speed of 135



RICHARD-BRASIER IGNITER.

km. (84 miles) per hour. The frame is of pressed steel, and no subframe is used, the engine and change gear being supported directly upon the main frame side members. The axles are hollow, of nickel steel, and made by Lemoine. The front axle is circular and arched at the center, and from the spring brackets to the end the section is rectangular. Each end of the axle terminates in a horizontal T, one arm extending upward and one down. The upward branch of the T forms a plain pivot bearing which is lubricated by a compression grease cup. The lower branch contains a ball thrust bearing, on which the greater part of the weight is supported. The body springs are semi-elliptic and all are provided with the Truffault shock absorbers. The wheel base is 104 inches and the track only 50 inches. The road wheels are mounted on ball bearings and are shod with 32x3.6 inch pneumatic tires in front and 33x5 inch in the rear. Upon the rear part of the frame is carried a peculiarly shaped gasoline tank, in which the seats for the driver and mechanic are formed. The capacity of this tank is 125 liters (32 gallons).

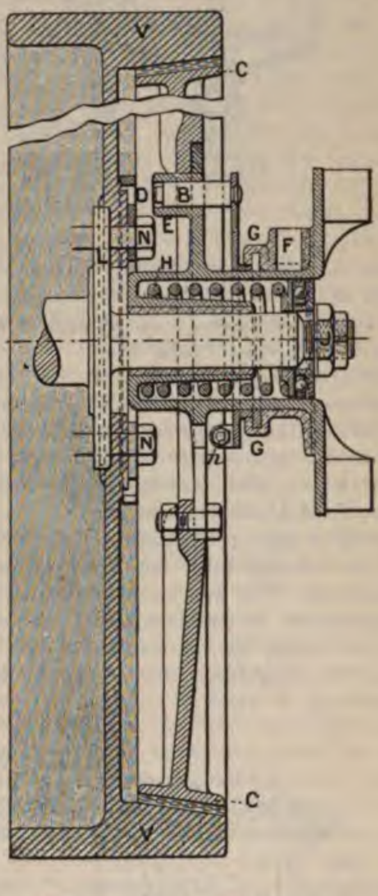
The motor cylinders are cast in pairs, and are of 6 inches bore and 5.6 inches stroke. M. Brasier does not believe in steel cylinders, because of the poor bearing conditions for the piston, necessitating extremely copious lubrication to avoid abnormal heating. The eight valves are all operated mechanically and are interchangeable with each other, as well as their springs. The cams are, of course, different for the inlet and exhaust valves. All valves are arranged on the same side of the motor.

The motor is fitted with a large fly-wheel, 24 inches in diameter. It gives a maximum of 80 h. p. ato 1,200 r. p. m. The speed may readily be varied from 200 to 1,300 r. p. m., which allows of driving the car on the high gear at as low a speed as 20 miles per hour. By operating the throttle lever, the speed may gradually be increased from 20 to 84 miles per hour.

Ignition is accomplished by means of a Simms-Bosch rotating magneto. The ignition terminals are of the Brasier type. The magneto armature is driven through a fibre gear. It is to be noted that the vehicle of Thery, the same as all other Richard-Brasier cars, is not provided with a spark advancing lever. There are only two points of ignition—a late point for starting the motor, and a fixed advance (¾ inch in Thery's vehicle). The driver need therefore never bother with a spark lever.

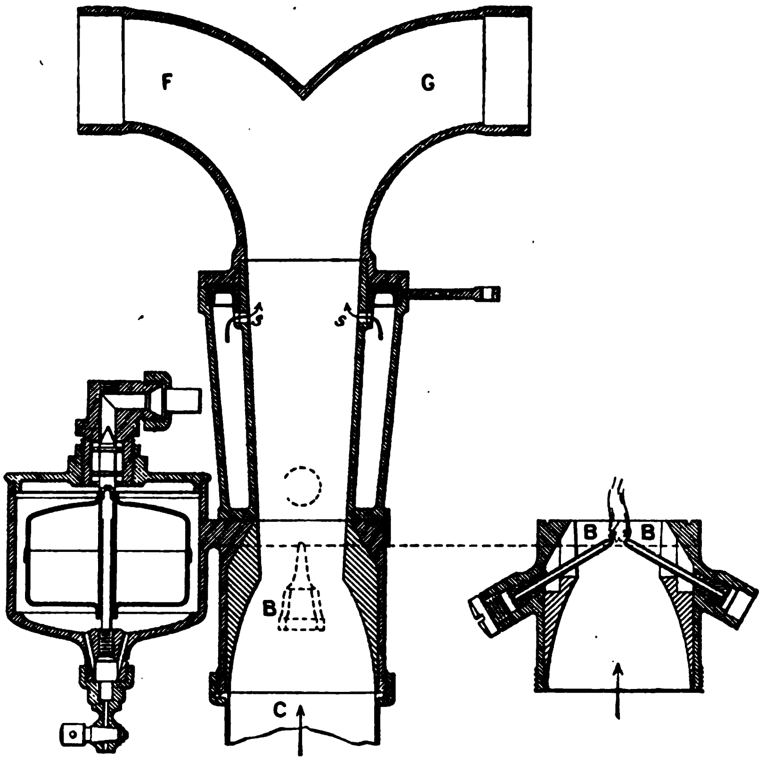
The sparking mechanism is illustrated in Fig. 1, from which it will be seen that the spark terminals are operated by a cam on a half speed shaft Y. The terminals L and B within the cylinder remain apart during nearly the whole time of revolution of the cam. Then, a little before the spark is to be produced, the cam begins to raise the rod T, which at its upper end carries the arm P. This arm P acts on the lever N, and since N and L are fast upon the same shaft, the terminal L is thereby brought into contact with the stationary contact point B and allows the current to pass. The spring R' is extended by this motion. In continuing its motion, the cam still further lifts the arm P, which at its upper end is provided with sharp corner. During the upward motion of this arm P, it remains in contact with a cam Q, and since it is pivoted to the base X and its face toward the cam is bulged outwardly, the higher it rises the further it is pushed outward by the cam Q, until suddenly its point moves beyond the limit of lever M and allows this lever to drop abruptly under the influence of spring R'; this results in a rapid break between the spark terminals L and B, entirely independent of the speed of the motor. The time of ignition may be varied by rocking the cam Q around its center by means of the lever K. In order to prevent the ill effects of the hammering of arm L on stationary contact B a spring R is interposed between lever N and lever L, which reduces the shock.

The friction clutch comprises an aluminum cone C, faced with leather, which engages into the recessed motor fly-wheel V, in the usual manner. But from 40 h. p. upward it is generally very difficult to obtain sufficient adhesion between the two parts to transmit the power of the motor without slipping. M. Brasier has solved the problem by making the cone of as large a diam-



RICHARD-BRASIER CLUTCH.

eter and with as great an angle as possible. Then he provided a disc with six steel pins B, securely fixed to the cone, the pins being adapted to engage in 6 of 36 corresponding holes D, cut in an annular flange secured to the web of the fly-wheel. The two operations, viz., disengaging the friction clutch and disengaging the pins, are accomplished automatically by means of the clutch pedal. The clutch fork takes hold at F. The cut of the clutch shows the parts in the position where, by means of a segmental collar GG, the pedal has drawn the disc with the steel pins B, to the rear, and by continuing the motion of the pedal, the



RICHARD-BRASIER CARBURETOR.

cone C is drawn to the rear. Experience is said to have shown this system to give perfect satisfaction, and it can be applied without modfication to stock cars.

The carburetor is of the float feed, spraying type. It is provided with two spraying nozzles BB, inclined toward each other and separated by a quarter of an inch. It also has two air inlets, one main inlet from below, C, and one supplementary inlet, consisting of small perforations *s s*, in the wall of the mixing tube, the latter admitting heated air. The two spraying nozzles produce a sort of liquid "butterfly" which is carried along by the current of air and which is incapable of settling on the walls of the inlet passage, as occurs in many defective carburetors. The fuel consumption during the Gordon Bennett Race was 42 liters (11 gallons) per round (87 miles). It will be noticed tha the carburetor is not of the so-called "automatic" type.

The motor is fitted with a centrifugal governor which acts on two throttle valves located, respectively, at the center of each pair of cylinders. The throttles are therefore always kept warm, thus avoiding the danger of recondensation beyond the throttles. The governor tends to constantly close the throttles, even at low speeds, but a small flat spring, counteracts this tendency and allows enough charge to flow into the cylinder to keep the motor running. A small lever located on the steering wheel allows of opening the throttles wide, and a pedal permits of locking the governor, thus allowing the motor to race. Thery had arranged the governor lever on his machine in such a manner that it served the same purpose as the pedal, and made no use of the pedal.

The exhaust takes place through four tubes which discharge into a large tube, serving as muffler, the wall of which at one end is pierced with a large number of holes. They calculated that about 3 h. p. was lost in the muffler.

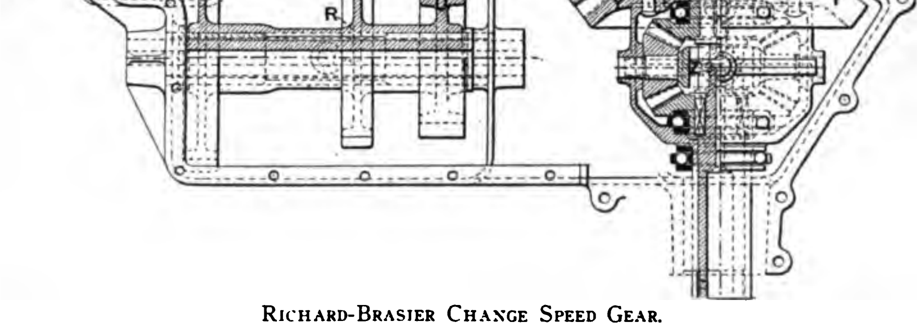
In the Richard-Brasier stock cars, the water circulation is effected by thermosiphon action, no pump being used, but owing to the large power of the racer, it was fitted. with a centrifugal pump driven by friction from an aluminum pulley fixed to the end of the starting shaft. The car was fitted with a Grouvelle & Arquembourg radiator through which air was drawn by a fan. The cooling system has a capacity of 7 gallons, and the motor never suffered from overheating, not even in the controls.

The engine is lubricated by a Hamelle automatic oiler. The motor drives through a shaft with universal joints, and a pair of bevel pinions, a horizontal shaft arranged within the lubricator case, this shaft carrying ten eccentrics. By means of these eccentrics are operated ten small oil pumps submerged in the oil, which draw in the oil when the pistons are raised by means of a spring and force it into the feed tubes when the pistons are forced down by means of the eccentrics and levers. The stroke of each pump is separately adjustable. The ten feeds supply automatically all the parts of the motor, the change gear, and the transmission which require lubrication.

The starting of this large motor is accomplished without much trouble. The driver grips the starting crank with his right hand and turns, and with his left he pulls on a conveniently located rod, by means of which he raises all of the exhaust valves a distance of 3-32 inch off their seats during the compression stroke, and simultaneously causes ignition to occur at the late point. As soon as the motor has run up to speed and the rod is released, the ignition automatically shifts to the early point.

The change speed case is supported at three points. The gear gives three speeds forward and one backward, the two first forward speeds being obtained by shifting the sliding pinions O Q by means of the fork *f*. Runing on the first gear, the motion is transmitted through O P U V: on the second, through Q R U V; on the third, the transmission is direct, the claws S of pinion V engaging into sockets T on pinion Q. For driving backward, a pair of pinions M N are introduced into the gear train.

The driving bevel pinion X has 31 teeth and the bevel gear Y, 40 teeth. The chain pinions have 26 teeth and the chain wheels



RICHARD-BRASIER CHANGE SPEED GEAR.

30 teeth. A worm and screw sector device is used in the steering gear. The worm has a diameter of 3½ inches and a circular advance of 1.6 inches, the inclination being 18 deg. Two separate foot brakes are provided consisting of steel bands lined with cast iron friction blocks, and operated each by a separate pedal, but acting on the same cast steel drum keyed to the counter shaft. Only a single brake was used in the Eliminating Trials, the second being added for the race in the Taunus, owing to the difficulty of the course. A hand brake acts on the rear driving wheels direct, this brake being of the internal expanding type.—*La Vie Automobile.*

Practical Guide for "Automobile Guests."

(From *Le Vélo.*)

The type of automobilist who "has no automobile at the present moment" is getting more and more in evidence. The "driving with friends" is very much in favor. It has, first of all, the advantage of obviating certain expenses, such as the purchase of a 16 h. p., its maintenance and the wages of a mechanic. The economies realized in this direction permit of greater expenditures for other articles, such as dust cloaks, goggles and gloves.

It is the proper form for a guest to show an inclination to appreciate the operation of the motor and the speed of the car. The statement, "We are going at forty-five miles," should always be met with, "at the least." It is very bad taste, when this remark is made, to draw a chronometer from your pocket. It is well known that chronometers are very incorrect as means of determining speed.

If the owner of the car, with a poorly played air of indifference, asks: "Do you think that I drive well?" reply: "Yes, but you have one fault, you are too reckless"—even if he is in the habit of applying the brakes as soon as he sees a chicken in the road at a distance.

If your car is overtaken by another, say: "It is most idiotic to race on the highway."

In my opinion. it is always best to deny any knowledge of repairing, especially tire repairing.

There are certain other rules which it is hardly worth while to mention, as the guest will follow them by instinct. These relate to accounts of the trip and the times of start and arrival. If you started from Rouen at a quarter to three and arrived in Paris at half-past seven, it is self-evident that the fraction, should be neglected, and that Rouen was left at three and Paris reached at seven.

Also, the loss of time due to mishaps should vary according to the circumstances. The same mishap which would take only a quarter of an hour if the skill of the mechanic was under discussion should be responsible for fifty-five minutes if the object is to prove a good average running speed.

By following these rules, and others which his instinct will dictate, the guest will be able to prolong his career as such, and may defer purchasing a car until the manufacturers bring out the "perfected machine," for which he has been looking several years already.

[These recommendations depend for their effectiveness upon a peculiarity of the French national character and are not applicable here.—Ed.]

Cause of Popping in the Carburetor.

Everyone who uses a gasoline motor has often experienced the annoyance of flashing back, popping, or back firing in the carburetor, as the phenomenon has variously been termed.

With the automatic type of inlet valve this has been ascribed to gumming or sticking up of the inlet valve. In some cases this is no doubt correct, although the same thing may be found to happen with a valve mechanically operated where the valve is held on to its seating by a very strong spring, and where also the seating is truly and well ground in with the valve. Still we find the popping continues, but is remedied by increasing the gasoline supply, an increase in the nipple orifice or a reduction of the air supply, always, of course, provided that the shortage of gasoline is not due to an insufficient quantity of gasoline in the supply tank or to an obstruction at some point between the supply tank and the orifice in the nipple. Any user with the smallest experience of gasoline motors and carburation immediately diagnoses the trouble, and says, "Hum, too little gasoline, or too much air," and increases one or decreases the other accordingly, and removes the cause of trouble at once.

But the real question is, What causes the popping and why does it take place? Although I have questioned a large number of experienced persons on this point, one and all have either shirked it or simply given the stereotyped formula, too much air, or too little gasoline, and left it at that.

This trouble was forcibly brought home to me on a number of occasions when a fairly large motor of the air-cooled type was employed on motor tricycles and quadricycles in conjunction with the De Dion pattern of surface carburetor. It was no uncommon occurrence to get an explosion in the carburetor, and although this was fitted with large, easy working relief valves, acting outwards, the carburetor, which was in a simple tank form, was repeatedly burst, necessitating an expensive job to repair it, with the ever present possibility that the same thing would happen again on the first run out.

One usually heard a slight popping in the carburetor as a preliminary warning, and if notice was immediately taken of it, and the air lever adjusted to give less extra air, the popping ceased and no harm was done. This usually happened when any hill climbing had been done and just as the summit of the hill was about to be gained.

The cause of the occurrence, after some thought, I put down to premature ignition while the inlet valve was open and the passing of explosive vapor over the heated exhaust valve, the vapor thus becoming ignited and then firing back along the inlet tube to the interior of the carburetor. However, we find that the same thing happens now when the engine is perfectly cold at starting, but owing to better proportioning of air inlet with the surface types of carburetor an excess of air is not usually obtained under working conditions, and there is not the danger there was of bursting the tank, and in the float feed type it is quite harmless. On studying an indicator diagram, in which varying proportions of gasoline vapor and air have been used in the engine. we find that as the mixture becomes weaker so is the ignition accompanied by less pressure, but also (and this is the important point) the time of ignition is retarded very considerably, and burning of the gases may, owing to the reduction of compression by the outstroke of the piston and weakness of the charge, be of a very slow nature and not the quick impulsive action which is usually associated with the gasoline engine. And this leads to an explanation of the cause of popping. The weak mixture is fired and is still slowly burning, only a low pressure being generated; the exhaust valve opens at its period to pass the gases to the exhaust chamber. When the exhaust valve closes there is still left in the combustion space a residue of gas, which is still burning at a comparatively low temperature (i. e., a flame is present, similar to that which was carried along in the old type of slide valve pocket on the Crossley gas engine to ignite the gases in the cylinder), and immediately this flame fires the incoming mixture, when the inlet valve opens, a flame is propagated down the induction pipe, the mixture becomes richer the nearer we get to the nipple, the combustion is there more rapid, hence an explosion or popping is heard. That this may be a feasible explanation of the phenomenon I think will be borne out by the recent work of Dugald Clerk, on the influence of late and early firing with various mixtures, when the engine employed was running light and under various loads. Others may have some explanation to offer which may throw light on the subject.—*J. W. Roebuck in the Autocar.*

The automobile works of Cudell & Co., in Aix-la-Chapelle, Germany, were completely destroyed by fire recently. Only after six hours of the most arduous efforts were the firemen able to control the flames. The entire equipment of the works and twenty-five cars ready for delivery were consumed by the fire. The works employed 200 men.

MAINTENANCE AND REPAIRS

[Suitable contributions to this department, accompanied by sketches, are solicited and will be well paid for.]

Some Examples of Poor Repair Work at Garages.

By John P. Conkling, M.E.

Automobiles when not in use, are generally stored in a garage, where, for a charge of $10.00 per month and upward, they are watched over by an attendant, washed, cleaned and polished when needed. There they are replenished with oil, gasoline, electricity and illuminating material. For these supplies, the proprietor of the garage charges extra, per unit of measure consumed by the machine. He also employs one or more mechanics, and one or more boys, who are designated apprentices. These mechanics, more or less skillful, and the apprentices generally do the repairs required on any of the automobiles stored in the garage. For the service of these mechanics, and the apprentices, also, the proprietor of the garage generally charges the customers about sixty cents per hour, while they are engaged repairing his machine. The wages paid these mechanics, and the apprentices, for the long hours of service, often including evenings and Sundays without extra pay, are generally not sufficient to cause them to remain long in one place, or to take much interest in their work, or the condition of their patrons' automobiles, so the work is frequently slighted. The following will illustrate how such repairs are sometimes made, and will disclose one of the reasons why the repair account so rapidly increases.

About a fortnight ago, I happened to be in one of these garages, while an adjustment was being made to a new automobile, valued at $3,500. A joint had been leaking, and one of the mechanics without sufficient experience to know the strength of the metal or the force he was exerting, in an attempt to tighten the joint had twisted off a case hardened steel stud. This little adjustment, which ought to have been done successfully by a skillful mechanic in ten minutes, had now developed into a repair job of a half day or more. A new stud had to be made, and the old one drilled out, as it was broken off too short and fitted too tight to be removed by any other means. The proprietor of the garage was called to advise the mechanic, and he ordered him to make a new stud of iron. I saw it made and put in place. The metal substituted was not half as strong as that of which the original stud was made. The new stud was rough in finish, and fitted into the hole loose and wobbly, about half of the thread in the cylinder casting having been drilled out in the effort to remove the buried end of the broken stud.

It was not my machine and I could make no protest against such work, but I wondered how long it would take that fine piece of mechanism to shake to pieces, if such adjustments and repairs were often made, and how rapidly that owner's repair account would increase.

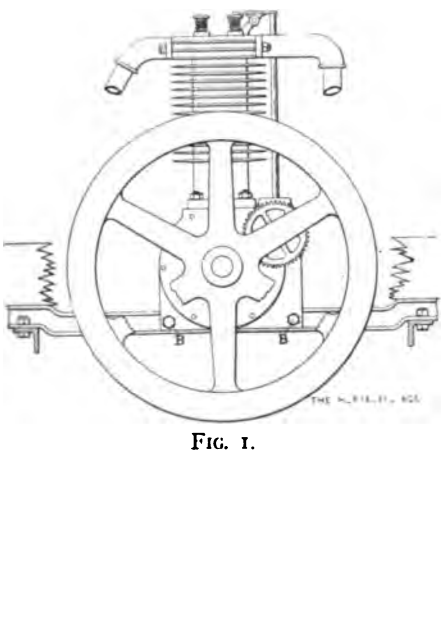


Fig. 1.

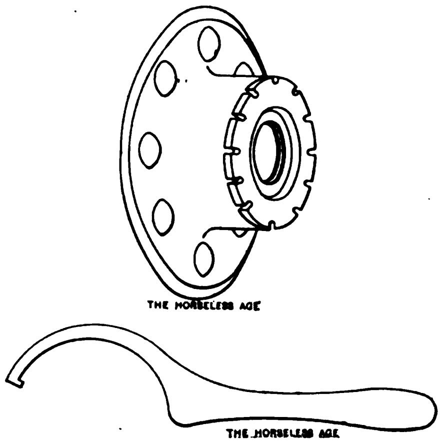


Fig. 2.

HOW NOT TO REPLACE BOLTS.

One day I was in another garage while two mechanics were replacing on its frame on the car, a four cylinder engine which they had been repairing. The bolts (BB Fig. 1) for holding the engine in position were of hardened steel and perfectly fitted to the holes. The holes in both the frame of the car and the engine, had been reamed perfectly in line, and to a nice fit. The mechanics had some difficulty in adjusting the engine frame so that its bolt holes came perfectly in line with the bolt holes in the frame of the car. Much to my surprise, they drifted the engine frame into position by driving the bolts into place with a heavy hammer. I examined the thread on these bolts, and found them badly battered and bruised, and surrounding them were a lot of chips scraped off from the inside of these reamed, nicely fitted joints. How long before that engine will be dancing a jig on the frame of its car, and the manufacturer be blamed for turning out poor work? How long before the owner of that automobile will complain of his rapidly increasing repair account?

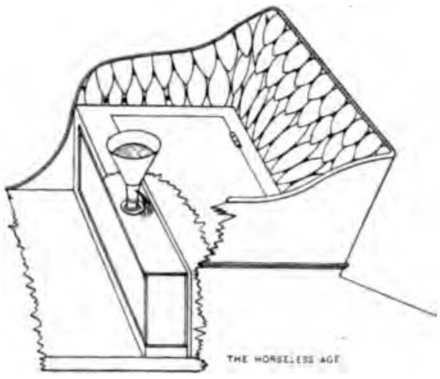


Fig. 3.

BATTERING UP A BRASS NUT.

Special tools and wrenches are sent out with each machine to fit the odd and singular-shaped pieces necessary in the construction of some designs of automobiles, and are intended for use in the adjustment and repair of these machines.

In one of these garages, where they were repairing a very fine imported car, I saw one of the workmen take a cold chisel and hammer to tighten up a beautifully finished brass nut on the inside of one of the rear wheels of that car (Fig. 2). The edges of the nut were carefully milled to receive a spanner wrench. The workman inserted the point of his cold chisel in these milled slots, one after the other, as he drove the nut around by repeatedly striking it with the hammer, battering and bruising each in its turn, until he had in this manner screwed the nut almost up to its place, where he left it. A little later I examined it. On each side of every milled slot all around that nut, there was a lump of brass sticking out from a thirty-second of an inch to nearly a sixteenth of an inch beyond the finely finished surfaces on each side of the nut; and each milled slot was so battered and bruised that it would have been practically impossible to apply the wrench. I asked the workman why he did not use the spanner wrench provided for that purpose. His answer was, "Can't find it." I then told him that if it was my machine, I should have preferred him to have made a new wrench, rather than to have battered the nut up in that manner.

A MYSTERIOUS LEAK.

I heard one garage proprietor advise one of his customers to have his gasoline tank repaired as it was leaking badly. This was apparently so, as I could see gasoline dropping from the pipe leading from the tank to the carburetor. I saw that repair job done. After monkeying with the tank for about five hours, it was proven conclusively that there was no leak in any part of the tank or piping connected with it, but that the funnel used in filling the tank had a leak in one side of the spout, and that while filling the tank, shortly before the owner came in for his machine,

the gasoline had been spilled over the top of the tank, and was just then dripping down over the floor (Fig. 3).

In one garage I saw a mechanic repairing a very fine car. I watched him but a few moments, when I concluded that at last, I had found a careful, conscientious, skilful mechanic who thoroughly understood his business. Judging from the care with which he did his work, and its perfection when completed, I concluded that he must be the owner of the car. I entered into conversation with him, and was pleased to learn that he was a machinist who had served his apprenticeship in one of the best shops in America, and had later worked in several other high class machine shops in this country; that he was now acting as a chauffeur and doing his own repairs; that this was the first time his machine had been in the shop in over a year, and it had been almost constantly in service during that time, and in his care. I concluded that the week he devoted to putting it in order again would be sufficient to insure its continuous operation for another year.

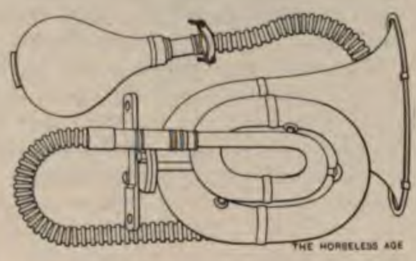
The Orient Tonneau Car.

The photo herewith shows a new side entrance tonneau car recently brought out by the Waltham Mfg. Co. As will be seen from the cut, the running gear and motor are arranged about the same as in the Orient buckboard. The car is shown occupied by four people of average weight, and it is claimed that it will carry such a load easily up all ordinary grades, and attain speeds of 18 to 20 miles per hour.

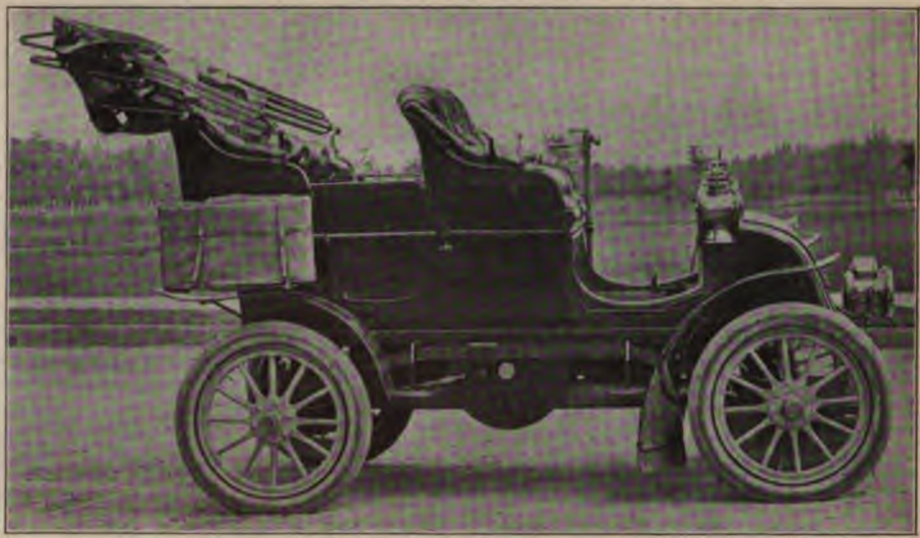
Orient Tonneau Car.

The "Autophone" Horn.

Emil Grossman, of 298 Broadway, New York, has received from France the first shipment of "autophone" horns, a feature of which is the double turn of the pipe, after the cornet type, producing a much greater volume of sound than the horn of



a single turn of pipe. The horn is made in two sizes, one with a 6⅛-inch bell, and the other with an 8-inch bell. The tube is of various lengths, 40, 50, 60 and 72 inches, as wanted.



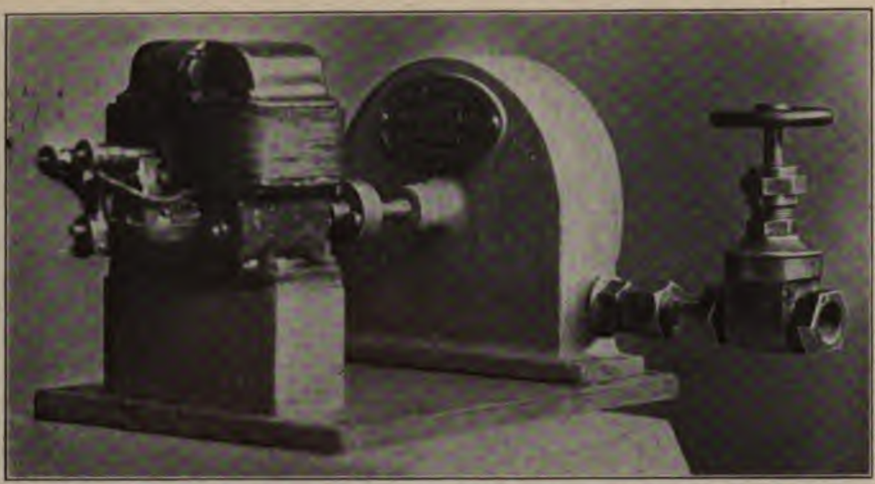
E. H. Cutler's Knox Touring Car.

Knox Car Equipped for Big Tour.

The cut herewith shows the new touring car of E. H. Cutler, president of the Knox Automobile Co. Mr. Cutler is now taking a two weeks' tour in this car through New Hampshire, Maine and along the Massachusetts coast with his family. Special features of the car are the side entrance and the brown canvas folding top, which extends over both seats. This top can be raised or lowered in 30 seconds, it is claimed. The car also has detachable side curtains. In place of baskets on the sides, Mr. Cutler has dress-suit cases which fit into waterproof canvas coverings, and by loosening three buckles the case can be detached. There is also a large carrying space underneath the back of the rear seat, with rear entrance to same. The top is very light in weight and acts as a very good dust shield when folded back as well as when open.

Charging Outfit for Ignition Batteries.

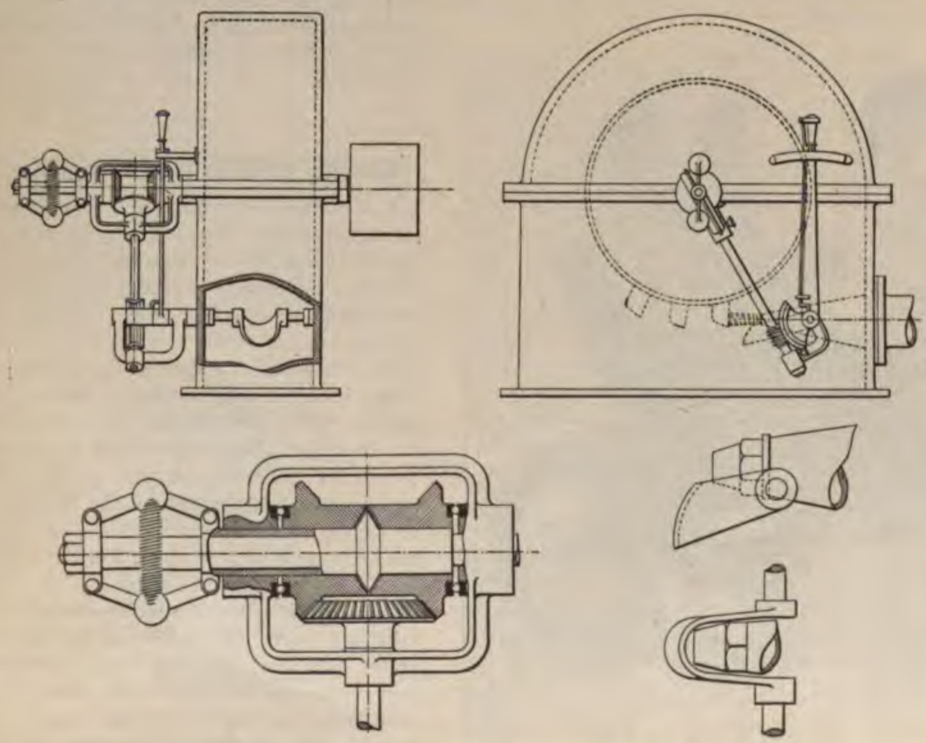
A convenient charging outfit for small storage batteries as used for ignition on some touring cars is manufactured by Percy Pitman, of Bosbury, Ledbury, England, and illustrated in the half-tone cut herewith. It comprises a small Pelton water wheel, direct connected to a dynamo. A general view of the motor is given in the two upper figures, while other details of the governing device will be easily understood on reference to the remaining engravings. The most interesting feature of the turbine is its governing arrangement. The most common plan of governing Pelton wheels has been to deflect the nozzle. This is effective, but involves the maintenance of an awkward water joint subjected to a considerable pressure. In other cases throttling-governors of different kinds have been used, some of which are very neatly arranged; but with long supply-pipes there is sometimes trouble with these if the load is



PITMAN'S CHARGING OUTFIT FOR STORAGE BATTERIES.

suddenly thrown off the machine, since the pressure at the nozzle is then largely increased by the water-hammer consequent on the throttling of the flow. In the motor here shown it will be seen that a small deflector is pivoted near the nozzle and can be moved up so as to catch and divide the jet, one portion of which moves on to drive the wheel, while the rest is turned by the deflector so as to clear the wheel and waste itself against the casing. It will be seen that the deflector is moved by a worm segment keyed on a prolongation of one pivot. This sector is in turn driven by the worm, which is actuated by a double-bevel gear, as indicated. A very light friction clutch, actuated by a ball governor, locks one or other of the bevels with the main shaft according as the speed rises above or falls below the normal, and the worm being driven thereby in one direction or the other cuts off more or less of the jet actuating the wheel. The rise of speed in suddenly throwing off the load is only 3 per cent. The quadrant can at will be disconnected from the deflector, and the wheel be regulated instead by the hand-lever shown.

The motor here shown is 6½ in. high above its sole-plate, and the casing is 6½ in. in diameter by 2⅛ in. wide. The Pelton wheel has twelve bronze buckets and is 4½ in. in diameter, and is designed to run at from 2,000 to 3,000 revolutions per minute, according to the water pressure available, the dynamo being wound to suit. The one illustrated is intended for charging 20-ampere accumulators and can be connected to any hydrant.



PITMAN'S GOVERNOR FOR PELTON WHEELS.

New Incorporations

Boston Automobile Dealers' Association, Boston. Capital, $5,000. President, Kenneth A. Skinner; treasurer, J. H. McAlmun.

Plainfield Auto Garage Co., Plainfield, N. J. Capital, $25,000. Incorporators: A. H. Wilson, J. B. Longhead, E. C. Longhead.

Wear Proof Pneumatic Tire Co., Huntsville, Ala. Capital, $2,000. Incorporators: F. Burnam, C. C. Green and John F. Lanier.

Motor Vehicle Transportation and Delivery Co., New York. Capital, $10,000. Directors: C. R. Ruckert, Chas. Schmitt, C. R. Smith.

The Dallas Auto Club, Dallas, Texas. No capital stock. Grove Scruggs, J. D. Schofield, John Hunter and others, incorporators.

Automobile Depot, New York. Capital, $5,000. Directors, E. C. Griffith and P. M. Pelletreau, of New York, and W. H. Estes, of Brooklyn.

Morgan and Harding Automobile Co., St. Louis, Mo. Capital, $10,000. E. L. Morgan, W. R. Morgan, A. G. Harding, incorporators.

Plainfield Auto Garage Co., Plainfield. Capital, $25,000. Incorporators: Andrew H. Wilson, Joseph B. Longhead, Elizabeth C. Longhead.

Broadway Automobile Exchange, New York. Capital, $2,000. Directors: L. C. Jandorf, H. H. Jandorf and John Brown, of New York.

The Citizens' Auto Transit Co., of Cleveland, at Columbus, O. Capital, $600,000. Incorporators, H. H. McKeehan, W. C. Merrick, W. B. Stewart, G. W. Cottrell and Julian W. Tyler.

The Merkel Motor Co. (of Milwaukee), at Madison, Wis. Capital, $200,000. Incorporators, A. B. Ferdinand, Joseph F. Merkel and W. J. Merkel.

The Hyne Motor Co., of Plainfield, N. J., has recently been incorporated with a capitalization of $25,000. The incorporators are W. B. Harsel, Harrison Coddington, Chas. F. Fulmer and Chas. F. Hyne.

Cook Kerosene Carburetor Co., Jersey City. Capital, $200,000. Incorporators: James J. Cook, Mungo J. Currie, Albert J. Cook, Henry M. Traphagen, Jersey City; John A. Currie, Greenville; Eugene L. Flandan, Portchester, N. Y.; Samuel G. Currie, New York City.

Under the auspices of the Automobile Club of Great Britain and Ireland, a motor car meet will take place on August Bank Holiday at Bexhill. The track has been lengthened and improved considerably since the last races. None but actual touring cars will be allowed to compete in the races. On the following Wednesday a battle of flowers and parade will take place. The prize fund now stands at nearly £300.

e St. Louis Automobile Tour.

By Harry B. Haines.

:n automobiles, gasoline and steam, ngines throbbing and generators gathered at Fifty-ninth street and venue on Monday morning to un- the St. Louis tour of the American bile Association, 1,218 miles across ites and over roads giving every of test possible of endurance and Confident of success and feeling ecurity in planning to reach their ion in fifteen days of running, these automobilists paid the highest pos- mpliment to the manufacturers of rld—the tribute of belief in their s. Less than two years ago a hun- le non-stop contest was a great heralded for weeks and rewarded old medals. For the high-grade car of to-day a hundred-mile run is unusual one, and to some drivers a five-hour jaunt across country. steam wagons and eleven gasoline s made up the New York quota of that started on schedule time, but n other parts of the country many achines were expected to be prepar- follow the various routes laid out ally reach that automobile Mecca, s.

AT THE START.

cene at the start was not unlike that beginning of the New York-Pitts- in last October. The day was but at times the sun broke through, promise of dry and dusty roads to the long trip to the far city of the A large crowd had gathered at the point and eyed the machines and cupants with undisguised curiosity, that even though the automobile st thinks lightly of a thousand-mile ordinary public still regard it as a ndertaking, and seem to think that something worth looking at in the e women and the machines who on it.

THE ENTRIES.

the light runabout to the most ap- and up-to-date imported and Amer- uring cars, the various types of pleasure vehicles were fairly well ted in the gathering that waited tarting time, the drivers meanwhile g their cars, oiling up and making ortable. In many of the cars were auffeurs to attend to such duties as ease cups and automatic oilers and inspecting their cars, while the at in the machines, smoking cigars, with friends and taking things general as they no doubt intend to oute. Some of the entrants took their own machines, but these were minority. The presence of the rs gave the impression that the run ig pleasure jaunt, which idea the e desired to have made prominent. erhaps because of the expense attached to making the trip with a complete touring outfit and a party of friends that so few entries were received, as the large touring cars cannot be operated very economically.

It was highly evident from the preparations made for the run that the men going through were ready to part with their shekels and would leave no stone unturned to have a good time. This feature of the run was so entirely different from the characteristics of every other contest yet held that it provoked comment. On all sides expressions of surprise were heard at the expensive and complete equipment of some of the big cars, and there was no doubt but that the general public was duly impressed by the display of wealth by the "favorite sons" in the ranks of the starters. The smaller cars were practically ignored by the curious public, but judging from previous runs the committee of awards will have to look after them at St. Louis.

The presence of ladies in several of the escort cars, becomingly dressed in their up-to-date auto clothes, conveyed the idea of a pleasure trip devoid of the possibility of break-down and all-night camping out in the rain. Mrs. A. L. Riker, who was the first of her sex to participate in an endurance run, accompanying her husband to Pittsburg last fall, when she qualified as a "Mud Lark," was present, and one other of the fair sex fell into line in the person of Miss Laura Lillibridge, who intends to go through to the big fair, even if she does have to rough it a little.

EQUIPMENT OF CARS.

Each car lined up for the start was provided with a banner bearing the inscription, "St. Louis Tour—A. A. A.," and the official number. These banners were conspicuously displayed on either side of the machine.

In most of the machines the tonneaus were filled with baggage, extra tires and parts. One car in particular was well fitted out, and a glance inside the tonneau showed a great collection of materials—four extra inlet valves, with springs; the same equipment of exhaust valves; a spark coil complete and a number of spark plugs. There were also chains to put on the driving wheels in wet weather, to prevent skidding; a collapsible water bucket; a funnel and strainer and a chamois to strain gasoline through, in order to exclude water from the tank; an extra belt for the fan on the water radiator, extra driving chain links, tire repair outfit, two extra outer shoes, four inner tubes, air pump, cotter pins galore and a complete set of tools. Other cars were as fully equipped, and most of the machines were fitted with rubber covers in case of rain. None had touring tops or canopies.

It was shortly after 8:30 o'clock when the contestants began to gather at the starting point. Before this hour Mr. and Mrs. A. L. Riker, Mr. and Mrs. Frank Nutt and a number of other automobilists who were to accompany the participants of the tour a short distance on the first day's run arrived. Before 9 o'clock the street in front of the A. C. A. headquarters was crowded with persons gathered to see the start.

SCENES AT THE START.

There was an almost continuous clicking of camera shutters as the various machines were photographed. Miss Laura Lillibridge, seated in a White steamer, had the distinction of being the only woman to start on the trip, and she seemed to enjoy that distinction, as well as the attention the camera fiends and newspaper men paid to her. Mrs. Susan D. Malpas, of the Ansonia, New York City, was to have started in her Panhard car with three friends. She sent word, however, that she would be unable to start until Tuesday morning, and would then follow the crowd, and, if possible, catch up to them at Syracuse, N. Y.

At 9 o'clock eleven cars were on hand and ready to start. Secretary A. L. Tucker, of the A. A. A., and his assistant, Mr. Downs, were charged with the entire responsibility for the run. Owing to a delay in the arrival of the route cards, the participants were unable to start on schedule time, and it was 9:28 A. M. by the Plaza Bank clock when Augustus J. Post turned into Fifth avenue from Fifty-ninth street and started the run. There was no tooting of horns or cheers in farewell as in the past, and, in fact, the whole start was about the tamest thing of its kind that has as yet been held.

Car 31, with Ray D. Lillibridge at the wheel, was next off. There were twenty-three cars scheduled to start from New York, but only fifteen got away.

The various machines are accounted for as follows:

No. 3—Pope Hartford; driver, C. H. Gillette; passenger, Mr. Wells.

No. 4—White Steamer; driver, C. Page; mechanic, R. Greene; passenger, H. Newton.

No. 10—White Steamer; driver, Augustus Post; mechanic, L. R. Thompson.

No. 14—Peerless, 70 h. p.; driver, R. P. Wanson; mechanic, Gus Belvanus; passengers, R. P. Scott, Emerson Brooks, G. P. Adams and C. S. Scott.

No. 24—Haynes-Apperson; driver, C. W. Birchwood; passenger, G. H. Kaufman.

No. 31—White Steamer; driver, Ray D. Lillibridge; mechanic, W. E. Sonnanstine; passenger, Miss Laura Lillibridge.

No. 32—White Steamer; driver, Webb Jay; mechanic, C. S. Denzer.

No. 33—Knox; entered by Eugene C. Hall, New York City. Is to start on Tuesday morning and join the run at Buffalo, N. Y., or earlier if possible.

No. 34—Elmore (The Pathfinder); entered by Percy F. Megargle. This car reached New York Sunday night, July 24th, after completing the run to St. Louis, and started back again Monday with the crowd. Driver, P. Q. Megargle; passenger, R. G. Megargle.

No. 38—Cadillac; entered by W. B. Hurlburt, Detroit, Mich. Didn't start early on Monday; come along later.

No. 42—Darracq non-stop car; driver, F. A. La Roche; observer, Mr. Mason; passenger, Lee Strauss; alternate observer, H. H. Everett; alternate driver, Albert Le Blanc.

No. 47—Franklin Tonneau; driver, H. C. Esselstyn; passenger, John Gerry Bradley.

No. 53—Olds Tonneau; driver, D. B. Huss; passenger, F. Ed. Spooner.

No. 58—Yale, 16 h. p.; driver, B. C. Swinehart; mechanic, Lazarnick.

No. 59—Pope-Toledo, 24 h. p.; driver, Geo. Soules; passengers, A. L. Pope and A. W. Pope.

No. 60—Buckmobile; driver, A. J. Seaton; passenger, J. W. Seaton.

The fact that the run would not be entirely free from attempts at winning glory, etc., by speeding was demonstrated when it became known that car No. 42, entered by F. A. La Roche, had been given official permission to attempt a non-stop run, and would not follow the schedule laid down for the other tourists. A great deal of unfavorable comment was heard, as most of the participants on the tour believed that La Roche's exhibition was only an attempt to secure a lot of free advertising, and would result in a reckless race against time, in which speed ordinances would be violated and all laws of the road disregarded, despite the entrants' assurances to the contrary.

It was stated at the start of the tour that La Roche, sanctioned by the A. A. A., would attempt to put his car through on a schedule by which he would reach St. Louis at 9 P. M. Thursday, or in 84 hours' running time for the trip. It is planned to have La Roche drive until tired, and then the wheel will be taken from him and the car kept moving until he is rested again. Albert Le Blanc is the relay driver. La Roche started on schedule time, having all preparations made to carry out his plans if possible. His attempt was fully sanctioned by the A. A. A., who furnished him with observers to note his performance.

AT POUGHKEEPSIE.

The finish of the first day's run, at Poughkeepsie, was uneventful to a large extent. Messrs. Tucker and Downs, who traveled by train with the special representative of THE HORSELESS AGE, reached the Nelson House before 3 o'clock. At 3:15 F. A. La Roche drove up in his Darracq car, having been on the road since 9:44 A. M. He reported the roads traversed in good condition, although slightly muddy. His engine, he said, had not stopped, and at 3:22 P. M. he started for Albany. Le Blanc left by train for Utica, where he will take the wheel and drive the car to Buffalo. It was reported authentically, although unofficially, that La Roche had been in collision with a trolley car at Yonkers, N. Y. He had attempted to cross in front of the car, and the motorman, refusing to realize the great importance of the car's performance, didn't stop. The wheels of the Darrocq crossed over the fender, smashing it. The machine careened over slightly, but, fortunately, was not overturned. La Roche got away from the scene of the accident without comment, his motor still unstopped.

Car No. 59, a Pope-Toledo, driven by Mr. Soules, finished next, at 3:18 P. M. Its trip had been uneventful, except for the fact that it hit two inquisitive canines that blocked its path. No. 31, a White steamer driven by Ray D. Lillibridge, was next. His report was "no trouble." Miss Lillibridge, tired but happy, was glad to leave the car after the seventy-six mile run. No. 47, the Franklin tonneau, followed. The rest finished in this order:

No. 10, White Steamer, Augustus Post; No. 4, White Steamer, Carl Page (Mr. Page driving in place of Windsor T. White); No. 3, Pope Hartford, C. H. Gillette; No. 38, Cadillac, Mr. Hurlburt driving; No. 60, Buckmobile, entered by Black Diamond Auto Co.; No. 58, Yale, fitted with solid rubber tires (repairs were made on the carburetor at the Poughkeepsie garage). The following also reached Poughkeepsie in good time: No. 24, Haynes-Apperson; No. 32, White Steamer (arrived at 5:30); No. 53, Olds Tonneau (arrived at 5:30); No. 61 Royal Tourist (arrived at 5:25) No. 34, the Elmore Pathfinder, got in shortly after 6 o'clock.

A few of the contestants kept their cars in front of the Nelson House and made short runs around the city before dark.

ENTRIES STILL COMING.

A telegram was received by Secretary Tucker, stating that five more entries had been received. Three will start from Chicago and two from Grand Rapids, Mich. This brings the total list of entries up to sixty-eight. A message was also received stating that the procession coming by the New England route would meet the main line tourists at Albany Tuesday evening.

There was no entertainment provided at Poughkeepsie, and all the tourists turned in early, in order to be ready for an early start in the morning.

No. 14, the 70 h. p. Peerless, came limping into Poughkeepsie at 7:25 o'clock, drawing up in front of the Nelson House with a flourish of bugles. They had lost the road several times and had been delayed owing to the overheating of their motor, the fan belt having broken off and been lost a few miles out of New York City. This was the last car expected, and the first day's run closed with all the starters having reached their destination—sixteen in all—the Cadillac, No. 38, having started late after the main batch of fifteen starters.

EVENTS OF THE DAY.

The Elmore car, which only completed the run from New York to St. Louis on Sunday night, doing the whole distance without a single puncture, had three punctures on the run to Poughkeepsie, and was delayed considerably by them. This car also had some trouble with the lubricating system. The Yale car, entered by the Swinehart Tire Company, met with a strange accident several miles out of Poughkeepsie. A dog ran out and was struck "fair and square." The carburetor was knocked out of line and partially broken. It was repaired after some difficulty. The Buckmobile entry was delayed a short time as a result of a chain jumping. This had to be replaced and tightened. The Haynes-Apperson entry was obliged to run slow, owing to trouble with the lubrication system.

The official garage, owned by John Van Ben Schoten at 56 Catherine street, was in readiness for the tourists. Little repair work was done, all the cars being looked over generally and well lubricated. Contrary to the custom followed on the Pittsburg run, the mud and dirt were washed off all the cars, and they will not carry 100 or 200 pounds of soil as did the mud larks. Mr. Van Ben Schoten very kindly placed his car at the disposal of the committee for their use while in Poughkeepsie.

It was announced at the Nelson House, in Poughkeepsie, the A. A. A. headquarters, that the factory of the Buckmobile Company, at Utica, N. Y., would be open for the use of the tourists and its staff of mechanics would be at their disposal.

The roads had been well marked with signs and confetti, and the tourists had no trouble in following the course laid out. To-morrow night, at Albany, several more tourists will join the main line procession, including Dr. W. E. Milbank, of that city, who will drive an 8 h. p. Knox runabout to Buffalo; Dr. Julian A. Chase, of Pawtucket, R. I., who is driving a Stanley steam car from Providence, and George Otis Draper, of Hopedale, Mass., driving a 24 h. p. Packard car, he having started from Worcester over the New England route.

ORGANIZATION OF THE TOUR.

The run itself is under the direct management of the Touring Committee of the American Automobile Association. Up to Monday, it is claimed, this committee had expended nearly $2,000 in preparing for the tour, collecting data, marking roads and issuing maps and other printed matter. This committee is composed of Augustus Post, New York City, chairman; Frank X. Mudd, Chicago, Ill.; H. W. Smith, Syracuse, N. Y.; Charles J. Glidden, Boston, Mass.; R. P. Scott, Baltimore, Md.; George S. Waite, Cleveland, Ohio; W. C. Temple, Pittsburg, Pa.; H. Bartol Brazier, Philadelphia, Pa.; William Monypeny, Jr., Columbus, Ohio; G. H. Walker, St. Louis, Mo.; Frank A. Garbut, Los Angeles, Cal., and C. H. Gillette, New York City. Local committees have been appointed in all sections of the country to assure proper attention for the tourists.

ı almost every city where a night stop ıade arrangements have been completed rovide an enclosed garage for the stor- of machines. Each participant is to :hase his own supplies, including gaso- and to pay a nominal charge for the age of his car. Any repairs desired be made on the cars without penaliza- , the only condition for a clean score g that the contestant register his name ıe official book provided for the purpose ıe headquarters at the end of each day's before 10 P. M. This leaves the mat- of time consumed en route entirely to judgment of the contestants. Their d will be limited by the State laws ·, and the chances are that there will be usual racing between the drivers of the ı-speed cars that has marred every con- held in the past, although little of this :loped on the first day out.

he only award in connection with the will be a certificate which will be given at St. Louis to all who have completed run and have registered in the official : at each night stop. The certificate state the conditions, the distance trav- and the fact that the contestant made night's stop on schedule time.

ACTING AS MESSAGE BEARERS.

ıme of the tourists are carrying mes- s from the mayors of Eastern cities to or Rolla Wells, of St. Louis. Gover- Batcheller, of New Hampshire, and ernor Bates, of Massachusetts, are to greetings to St. Louis by the automo- line. Letters will also be carried ı the mayors of Boston, Spring- , Albany, Utica, Syracuse, Rochester, alo, Cleveland, Toledo, Chicago, oit, Springfield, Philadelphia, New c, Baltimore, Pittsburg, Columbus, mond, Indianapolis, Louisville, Kansas . Cincinnati and other cities en route. ıe will be presented by the survivors to chief executive of the Exposition City St. Louis Day, August 11th, when the ists will parade in their machines ugh the city and the Fair Grounds.

is the intention of the committee to Augustus Post see the participants each morning. A. B. Tucker, who has charge of garage and hotel arrange- :s and will also issue press matter, will head by train each day.

.ch contestant is furnished with com- route cards, placed in a waterproof er case with a celluloid face, into h the cards may be slipped and kept ready reference. Supplies of confetti been shipped to all-night stops, and cars will start out each morning and : the roads. Local clubs in the various ons have assisted as far as possible in :ing the route with confetti.

e Society of Motor Manufacturers Traders, London, are offering a prize :n guineas for the best design for a r for their exhibition to be held at ıpia in February next.

The Hundred Mile Mark Passed.

In the flying kilometer race at Ostend, Belgium, on Wednesday, July 20, Rigolly, of Paris, in a 120 h.p. Gobron-Brillie car made a new record of 21 3-5 seconds, corresponding to a mile in 34 3-5 s. and 103.57 miles per hour.

Club Notes.

CLEVELAND A. C.

The club tour to Toronto and Niagara Falls proved an exceedingly pleasant outing for those who took part. The presence of a goodly number of ladies added largely to the success of the affair.

A. C. A.

The Runs and Tours Committee invited the members of the club to escort the tourists to St. Louis as far as Peekskill, the noon stop of the first day's run, and urged as many as could to continue on to Poughkeepsie, the night control, the object being to give those tourists an enthusiastic send off.

RHODE ISLAND A. C.

The annual run to Newport was held on Saturday, the 16th. A large number of members took part and enjoyed a run about Newport on Sunday morning. The return trip to Providence was made in the afternoon. The Newport Engineering Co. entertained the members of the Rhode Island and Newport Clubs at luncheon Sunday. The club's annual race meet will probably be held in September.

Warning to Tourists.

The A. A. A. on July 21 issued the following letter, signed by its president, Harlan W. Whipple, which was sent to the participants in the St. Louis tour and to the press:

"The American Automobile Association wishes to call the particular attention of the participants in the St. Louis run to the matter of their conduct in driving their machines during the run. The interests of thousands of people who ordinarily would not notice us will on this occasion be directed to our performance. We want you to join loyally with us in being particularly careful during this run in the way in which you meet and pass teams, in avoiding racing and in the way in which you observe the speed laws of the different cities and towns through which we pass. We wish to warn you that any car that is convicted of flagrant violations of the rights of others on the road or of speed laws will be disqualified and will not receive a certificate.

"We believe that careful attention to one and all of these regulations will do the cause of automobiling more good than anything else we can do, and we know that you all want to aid us in accomplishing this result."

Hand Book of "Licensed" Gasoline Automobiles.

The Association of Licensed Automobile Manufacturers, 7 E. 42d street, New York City, has in process of compilation an 85-page hand book giving illustrations and the general specifications of 75 gasoline cars of domestic and foreign manufacture. The scope and purpose of the book are described as follows in a circular issued by the Association:

"This 'Hand Book' is issued primarily for convenience and information to the prospective purchaser of an automobile. The products of the principal manufacturers throughout the United States of America and the importers of gasoline machines are shown by illustrations and specifications. These specifications form a series of the leading questions that arise in the mind of the purchaser, with the answers thereto printed in red ink. The questions being uniform, the ease of comparison is obvious and the purchaser is enabled to select the machines which are best suited to the service required, to his personal taste, or the means at his command."

The book is to be nicely printed and bound and will be ready for distribution about September first. It will be sent to any address at the cost of the postage, six cents. Needless to say, it will only deal with the product of members of the "Licensed Association."

Legislative and Legal.

Martin Rudy and Morris Ressler, of Lancaster, Pa., brought the right of the turnpike companies to charge toll for automobiles to a legal issue by battering down one of the gates after the keeper had refused to let them through without paying. They were arrested and will contest the case.

On July 19 Mayor Harrison, of Chicago, signed the new automobile ordinance for that city. Operators are to be licensed and must pass a very rigorous examination, both physical and mental. The new law is very unsatisfactory to the automobilists.

A minimum age limit for operators of 16 years is provided for in the proposed automobile ordinance for Saginaw, Mich.

The chief of police of Atlanta, Ga., has issued orders for strict enforcement of the automobile ordinance.

Automobilists of Jackson, Mich., are wrestling with the problem of securing a modification of the speed restrictions imposed by the local ordinance. A maximum speed of seven miles per hour is permitted in the business sections.

Mayor Jackson, of Rockford, Ill., has vetoed an automobile ordinance recently passed by the Common Council, upon advice from the Corporation Counsel that the measure could not be enforced.

MINOR MENTION

The Automobile Club of Canada was organized in Montreal recently.

Movements are on foot to organize automobile clubs in Akron, Ohio, and Springfield, Ill.

The New York Motor Cycle Club is considering holding a run to Philadelphia some day next month.

Long Branch, N. J., motorists are planning to hold an automobile show some time in the coming fall.

J. E. Crater, of the Central Automobile Co., of Newark, N. J., has opened a garage at Asbury Park, N. J.

Several of the bicycle policemen of New York City are to be supplied with motor cycles in the near future.

August 17 and 18 are given as the dates for a proposed automobile race meet at Hamlin Track, Minneapolis.

The Merkel Motor Co., of Milwaukee, are planning to erect a new building to cost between $50,000 and $60,000.

E. A. Fraser, the Hawaii Railway Co., Ltd., Mahukona, Hawaii, desires catalogues of automobiles and parts.

The Briscoe Mfg. Co., Detroit, Mich., wish us to deny a rumor that they contemplate going into the automobile business.

The figures of the assessors of St. Paul show an increase of from 25 to 87 in the number of cars owned by residents of the city during the past year.

It is reported that there is a movement on foot to organize a new automobile club in Philadelphia with a view to increasing interest in races and endurance contests.

It is understood that an automobile stage line will soon be put into operation between Maytown and Marietta, Pa., to compete with the horse-drawn stages now running.

The Moline Automobile Co., of Moline, Ill., will soon build a new factory in East Moline. It is understood that the main building will be 60 x 130 ft. and two stories high.

Windsor T. White, president of the National Association of Automobile Manufacturers, returned to this country on July 19, after a two months' automobile tour in Europe.

The Curado Willow Ware Co., 1524 Frankford avenue, Philadelphia, are manufacturing a line of automobile baskets which are guaranteed to be dust and moisture proof.

An attempt to reduce the record for the run from Chicago to New York will soon be made by Jerry Ellis and A. G. Schmitt, of the Chicago Automobile Club, with an Apperson touring car.

The Steam Carriage Boiler Co. of Oswego, N. Y., are marketing the "Ideal" kerosene burner, which is claimed to insure perfect combustion and to operate without carbonization and odor.

The Newport (R. I.) Amusement Association has arranged to hold an automobile race meet on Sachuest Beach on Saturday, July 30. Six races will be run off under the direction of Reginald Vanderbilt.

The Rhode Island Automobile Club has written the police commission of Providence, calling attention to the laxity in enforcing the ordinances relating to the throwing of broken glass, etc., into the streets.

E. J. Pennington, the promoter of automobile concerns, was released on $1,000 bail on July 13, after having been in jail in Pittsburg, Pa., for several days on charges of conspiracy and of defrauding a hotel keeper.

The Police Commissioners of New York City have received a communication asking that badges be issued to such automobile owners and chauffeurs as desire them, so that they may arrest persons who throw stones at them.

It is reported that the Board of Trade of Monticello, N. Y., has decided to operate an automobile stage line between that town and Middletown to compete with the railroad, efforts to secure a satisfactory train schedule having failed.

As the result of a grade crossing tragedy at Gravesend avenue and King's Highway, on Long Island, on July 20, four persons were injured, one fatally. The victims were the occupants of an automobile which was struck by a freight train.

The new Philadelphia salesroom and garage of the American Darracq Automobile Co. has been opened at 317-319 North Broad street. It occupies four floors and is claimed to be capable of housing 100 cars. Samuel H. Shaw is manager.

The Automobile Club of Kansas City recently decided to invite the members of the City Council to take an automobile ride over the boulevards of the city, the object being to convince them that eight miles an hour is an unreasonably slow speed for automobiles.

An offer of $50,000 has been made by A. Jacobs and D. Blumenthal, of Detroit, Mich., for the bankrupt estate of the Model Gas Engine Co., Auburn, Ind., and unless a better bid is received by the trustees before August 2 the offer will be accepted.

The Diamond cup given by the Diamond Rubber Co. for 5-mile free-for-all races for manufacturers will be put up for the first time this season at the automobile races in Cleveland in August. The cup was last won by F. A. LaRoche at the Empire Track last fall.

The Ford Motor Co., of Walkerville, will soon be incorporated under the laws of Canada. The capital stock of $125,000 will be held chiefly by the Ford Motor Co., of Detroit. The old Walkerville Wagon Co.'s plant will be used for the manufacture of automobiles for the Canadian trade.

F. A. La Roche, who recently drove a motor car 1,053 miles without stopping the motor, will start on July 25 on a 3,000-mile run of the same sort. He has selected a course from New York to St. Louis and Kansas City and return and will be accompanied by official observers of the A. A. A.

Chas. J. Glidden has offered the A. A. A. a $2,000 cup, which is to be competed for by touring cars. Although nothing definite has been decided in regard to the conditions of competitions, it is understood that they will be such that the contest will assume the character of a tour rather than a race.

It is reported that the executive committee of the Automobile Club of California has sent out circular letters to its members to obtain their opinions as to the advisability of holding race meets under the auspices of the club and as to the nature of races that would prove the most beneficial to automobiling in general.

The committee in charge of the entertainment of the G. A. R. veterans upon their coming visit to Boston has met with unexpected success in its efforts to borrow cars from owners for the purpose of giving the old soldiers an automobile outing. The plan is to drive them through the Newtons, Concord, Lexington, Cambridge and other places of historical interest.

The National Association of Manufacturers, 170 Broadway, New York, is sending out a pamphlet entitled "Closed Shop Agreements Criminal," dealing with a recent decision of Judge Francis, of Chicago, sustaining an injunction issued on the application of the Kellogg Switchboard and Supply Company, in Chicago, against certain labor unions, restraining them from picketing the works of the company. Copies of the pamphlet may be obtained by addressing the secretary of the association.

Acting under instructions from the Highway Commission, the Boston police stopped automobiles in all parts of the city in order to ascertain by an examination whether or not the owners had complied with all the requirements of the State law. It is reported that out of 248 cars stopped, 114 did not carry the required lamps, numbers, certificates or badges, 62 operators could not show certificates for either the car or chauffeur, 29 had no certificates for the car, and 13 had none for the chauffeur. Thirty-five cars had no numbers on the lamps, and 5 had no lamps. Two cars did not show the same number on the lamps and certificate. It is expected that many prosecutions will follow.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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THE HORSELESS AGE

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The St. Louis Tour.

At the time of writing the tour is still less than half completed, and it is therefore too early to pass an opinion regarding the measure of success it will meet. But as the event will undoubtedly receive its impress mostly from those participants who started east of Buffalo and complete the whole run, and only to a slight extent from the accessions to the party during the last few days before reaching St. Louis, its general character is already well determined. The tour, as abundantly foreshadowed, has turned out to be essentially a manufacturers' endurance run without the official observer feature which renders a contest of this kind valuable to the public and objectionable to some manufacturers. While it does not appear directly from the list of entries, practically all the cars which started from New York and Boston to make the whole tour are manufacturers' cars, and the "simon pure" amateurs in the run so far as Buffalo can be counted on the fingers of one hand. In this respect the tour will no doubt assume a somewhat different aspect as it progresses, and when the procession finally enters the World's Fair city, unless something unexpected should happen, private owners will be in the majority. To the preponderance of manufacturers in the tour must be ascribed the exceptionally creditable showing of endurance made so far, only one car having as yet discontinued involuntarily.

The run from New York to Buffalo being over the same route as the endurance contest of three years ago furnishes an interesting comparison, encouraging in one respect and depressing in another. The weather and road conditions last week were little better than in the early endurance run, but while last week, with one exception, all cars starting out with the intention of going as far as Buffalo or beyond reached that city, three years ago only about half the starters reached Rochester, where the event was declared off owing to the death of President McKinley. A better demonstration of the progress achieved in the making of reliable cars could hardly be asked for. On the other hand, at that comparatively early date in the history of the automobile movement, three years ago, eighty-one cars were entered for the contest and nearly all of them started, while last week the starters from New York and Boston combined numbered only twenty-three. The enthusiasm for long demonstration tours has evidently waned during these three years.

It might be argued that the two events are of entirely different character, but the difference is entirely theoretical, and with the exception of an insignificant number, the aims and purposes of the participants in the tour to this date are exactly the same as animated the contestants in the endurance run of 1901.

The St. Louis tour will not be an impressive demonstration by reason of the number of participants—a feature upon which much stress was laid during the early stages of its promotion—at least not during the greater part of the run. Whether it will be a wholesome demonstration of respect for speed laws and regard for other users of the highway on the part of automobilists, as President Whipple announced it his desire it should be, appears at this moment somewhat doubtful. But it will undoubtedly prove the possibility of making long tours in an automobile on schedule time when no limitations are placed on repairs. It must not be understood from this that extensive repairs are being made, but it deserves being pointed out that owing to the facilities provided by some of the manufacturers, the conditions are easier than those met by the ordinary tourist.

A New Explanation of Speed Accidents.

During the past few weeks the daily papers have been full of reports of automobile accidents, and one remarkable feature of these reports has been that in the vast majority of them the cause of trouble is stated to have been connected with the steering gear. It is explained that "a pin dropped out of the steering gear," that "something went wrong with the steering gear," that "some part of the steering gear broke," and that in consequence 'the car became unmanageable." Two accidents of this kind are reported in the New York *Herald* of Thursday of last week, for instance, and another one in the same paper on Friday. Now, while a mishap to the steering gear is very likely to cause a serious accident, it is hard to believe that the steering gears of so many cars are so carelessly constructed that they break or drop to pieces on the road, and we are rather inclined to think that the greater portion of these accidents are simply the result of reckless driving, mostly by comparative novices, who, to free themselves from blame, put it on the steering gear. In some of the accounts it is evident that the explanations of how it happened have been fabricated. Thus, one report states that "In rounding a sharp curve a short distance from the entrance to ——— a pin in the steering gear fell out and the machine ran wild. Unable to control the car, Mr. ———, his guest and the chauffeur held on to the sides of the machine. After tearing down grade for a quarter of a mile the car failed to make a sharp curve and brought up head on against a telegraph pole."

It is plain from the above that it was simply a case of "going it at the limit." If the steering goes wrong, this does not cause the car to "tear," but rather retards it, and if it had been going at a moderate pace, it could have been brought to a stop much inside of a quarter of a mile. At 20 miles an hour, the legal speed limit, the average car can be stopped by the brakes in a distance of 60 feet. The most probable explanation is that the curve was taken at too great a speed, the car began to skid on the down grade, and the driver lost his control of the car and ran into the telegraph pole. This would fully explain the "tearing down hill a quarter mile."

It was suggested in France some time ago that in case of a serious accident the Automobile Club should send an expert to the scene to investigate the cause and make a report to the club. Since it is a great injustice to the industry that accidents should in the public press be ascribed to failure of some parts of the machine, when in reality they are the direct cause of reckless, unlawful speeding, would it not be advisable for the National Association of Automobile Manufacturers to have an inquiry made into the causes of all serious accidents, at least those which occur in or near the large cities?

Ferry Boat Regulations.

Two steamboat inspectors who came to New York from Iowa after the "Slocum" disaster, to examine the river steamers here have discovered that automobiles employing gasoline as fuel are allowed to run onto and off ferry boats plying in the waters around the city, under their own power, and that the ignition current is only shut off after the cars are in position on the boat. The inspectors claim that this is in violation of Sec. 4,492 of the Revised Statutes of the United States, which provides that gasoline may be carried aboard passenger vessels when used as a source of power for automobiles, provided the flame is extinguished before the car is placed on the vessel.

The report that charges will be preferred against the owners of the boats concerned has caused many of the ferry companies to issue orders not to allow any automobiles except electrics to run onto or off the boats owned by these companies under their own power, and it would seem that in the near future all cars using gasoline as fuel will have to be pushed on and off the boats by hand, as is now required on the ferries between Camden and Philadelphia. While this is not particularly troublesome with the lighter class of runabouts, it is exceedingly annoying with the heavy touring cars, especially when getting onto a boat at high tide and off at low tide.

In view of the fact that cases of gasoline cars catching fire are almost unknown, the requirement of pushing these cars on and off by hand appears entirely unwarranted. There is certainly much less danger of a conflagration being caused by the ignition current while running the car onto or off the boat than by sparks from cigars or pipes of passengers who are allowed to stand in and walk through the carriage way. The requirement that all cars but electrics must be pushed on and off by hand would be particularly unjust to small tank boiler steamers, which have enough energy stored up in the boiler to allow them to run onto and off the boats under their own power, even if the fire is shut off entirely before driving on.

A large number of automobilists residing in and around the city of New York are vitally interested in this matter, and we are therefore glad to learn that the Automobile Club of America will endeavor to secure a prompt ruling from headquarters on the points raised. It is generally believed among automobilists that the wording "provided the flame is extinguished" has no application to cars propelled by electrically-ignited internal combustion engines.

Official Non-Stop Runs.

A rather serious blunder was made by the American Automobile Association early in its career as the National body in control of automobile events other than racing, when it allowed a dealer to start on an officially sanctioned and observed non-stop run simultaneously with the participants in the tour to St. Louis and over the same route. It is generally agreed that one of the chief dangers to the success of a run of this kind is the temptation to race into control stations, for the sake of the notoriety that attaches to such performances, and it should be the constant aim of the organizers to curb this effort to be "first in" or "ahead of the bunch." The serious character of this problem was pointed out to the officials repeatedly by would-be entrants, and assurance was given that the matter had been fully provided for. And then, strange to relate, at the last moment the Association officially gave a monopoly on all of the notoriety to be gained in this manner to one of the entrants. It is not to be wondered at that much adverse comment was heard among the participants in the tour on this action of the Association.

The idea of officially sanctioned and observed non-stop runs may be all right in itself. The only fault to be found lies in the fact that the Association allowed the party venturing on this run to enter officially in the St. Louis tour and start officially with the other participants. There may be need of officially observed non-stop runs of this kind when no practical public competitions are held. But in case the Association should decide to give its sanction and furnish official observers to any one proposing to

make such a run, we would point out the necessity of extreme care in the selection of observers, whose acts must be guaranteed by the Association. It is absolutely disastrous to appoint as observer one in any way interested in the success of the run, because the value of any record which may be made under official surveillance will largely depend upon the supposition that it was made under disinterested and impartial auspices, and if the observers fail to satisfy these qualifications, the public will soon lose faith in the records that may be made.

Mail Automobiles in Denmark.

According to a report from U. S. Consul Frazier at Copenhagen, the automobile commission recently sent on a tour through Germany, France and England to investigate the adaptability of automobiles for short mail route services, has just returned and made a favorable report.

The Danish Government has recently entered into a ten-year contract with a local company for the delivery of mails over the stage routes in Denmark proper. This company proposes to install automobile coaches in place of horse-drawn vehicles. This is an important branch of the postal service, since there are so many small islands without railways. The passenger and freight traffic make many of the routes quite profitable. Four automobile omnibuses of French and, probably, German and Scotch manufacture will be given a three months' trial, beginning with September of this year.

Following are some of the conditions to be met before any particular make of automobile will be purchased: The body of the car must be approved by the commission. The machine must be run 1,243 miles at the makers' expense, an inspector appointed by the commission being on board all the distance. The car is then to be taken apart and each part carefully inspected, cleaned, and readjusted, and the car is to be run for three days at expense of maker. The car will then be forwarded to Copenhagen and run for three months by a driver furnished by the maker, who shall be accompanied by an agent of the commission. The commission will pay the salary of the driver, will furnish gasoline and oil, and provide housing for the car. The commission will pay one-third the price of the car on ordering it, one-third on its delivery in Cophenhagen, and one-third at the end of the three months' trial, if it is found satisfactory.

The French Department of Posts and Telegraphs is soliciting bids for the transportation of the mails by motor vehicles between the following stations: Auxy-Beaune and Biscommun, Nibelle and Saint Amand and Theneuille.

Three Years of Automobile Exports and Imports.

While the total annual production of automobiles either in this country or abroad is impossible of exact determination, accurate figures are readily available regarding the number and value of cars imported each year into the United States and of the value of cars exported, the figures relating to this branch of our foreign commerce being published periodically by the Bureau of Commerce and Labor. But while the monthly or quarterly returns have been printed regularly in the HORSELESS AGE and other publications, it may be of interest to give a survey of the growth of exports and imports and a comparison of the two.

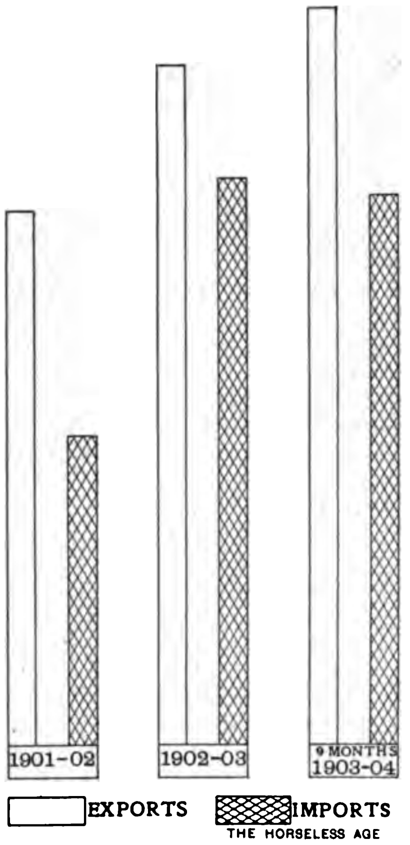


DIAGRAM OF UNITED STATES IMPORTS AND EXPORTS.

Readers of the metropolitan dailies will probably be surprised to learn that for every car of foreign manufacture imported into this country, at least five cars of native construction are exported, because a good deal of space is occupied in the daily press by cars of foreign origin, while exports of American cars have received little or no attention. One reason for this probably is that imported cars are mostly of the more expensive class, and are bought by men of high standing in the financial world, while the cars exported are mostly of the less pretentious runabout class.

Both exports and imports of automobiles practically date from 1901, and during all the intervening period the exports have always exceeded the imports in value and have always been greatly in excess in a comparison based on the number of vehicles.

The first foreign automobiles were probably brought to this country in 1895, when the De la Vergne Refrigerating Company, of New York, imported a Benz-Roger car from Paris, and the Mueller Mfg. Co., of Decatur, Ill., a Benz from Mannheim. These vehicles were imported with a view to their manufacture here. This was during the stagnation period following the panic of 1893, and many manufacturers were looking for new fields of profitable business activity. Although these cars showed up fairly well in contests, they were not deemed sufficiently practical to warrant their immediate manufacture, and before experiments toward their improvement had been terminated the condition of business had improved and the two firms above mentioned, now well supplied with orders in their respective lines, abandoned the automobile field.

Very few, if any, foreign cars were imported during the next three or four years, as the progress toward practicability was slow and the demand for automobiles small. In 1900 Kenneth Skinner took the United States agency for De Dion-Bouton motors and cars, thus establishing the first agency for foreign cars in this country. He imported only a few cars, however, as arrangements were soon made to manufacture De Dion vehicles in this country, with motors built in France, and most purchasers ordered American De Dions.

Importations of foreign cars began in earnest in 1901. A number of prominent men brought French touring cars with them upon their return from the Paris Universal Exposition in 1900, the touring-car fad took root here very quickly, and the American manufacturers, who up to that time had been building mostly runabouts, were unable to supply the demand for tonneaus. Agencies for Darracq and Panhard-Levassor cars were established in New York. The two endurance contests and several other automobile manifestations during that year resulted in a rapid increase in the demand for cars, and the two above mentioned importing concerns did a good business, as may be judged from the customs returns for that year. The value of imports grew enormously during the next year, 1902, most of the leading French manufacturers having by this time established agencies here or secured sales representatives. Besides, many American financiers brought private cars to this country. This year was probably the best business year for importers, for, although the imports have continued to grow slightly since then, the number of importers has also grown, and there is at present a great deal of competition in this particular field.

The general statistics of automobile imports for the whole country are compiled by the Bureau of Commerce and Labor, the imports being given for each fiscal year ending June 30. These figures are available up

IMPORTS OF AUTOMOBILES AND PARTS FOR CONSUMPTION IN THE UNITED STATES.

	Automobiles. No.	Automobiles. Value.	Parts. Value.	Total Value.
Year ending June 30, 1901	25	$43,094	$4,377	$47,471
Year ending June 30, 1902	224	530,876	19,323	550,199
Year ending June 30, 1903	317	963,998	45,003	1,009,001
Nine months ending March 31, 1904	279	872,251	101,251	973,502

to March 31 last, and are given in tabular form herewith. The diagram herewith shows the relative value of total exports and imports during the fiscal years 1902 and 1903, and during the nine months ending March 31, 1904.

A good idea as to the origin of cars imported into this country may be obtained from the table herewith giving the importations into the Port of New York during the years 1901, 1902 and 1903. It is evident from the table that the country of origin is not always identical with the country of manufacture, as the 13 automobiles shipped here from England in 1902 are evidently for the most part of Continental manufacture, imported into England and re-exported.

For the present year only the returns for the first five months are yet available, up to May 31st. During this period there were imported 158 automobiles, of which all but 10 were from France. The total value of the vehicles was $511,694, and those of French make were estimated at $467,904, an average of $3,162 a car. From Germany seven machines were imported, at an average value of $5,332 each. Three cars, valued at $6,462, were received from Italy. The total of these imports shows a considerable increase over that for the corresponding period last year, during which time 134 automobiles, valued at $433,151, were received at New York.

Over 90 per cent. of all cars imported so far have been entered at the Port of New York, but recently a considerable number of cars have arrived at Boston, where two general agencies for foreign cars are now located. The following table shows at a glance the number of cars imported at Boston each year since 1901:

IMPORTATIONS OF AUTOMOBILES AT BOSTON.

	No.	Value.
Year ending Dec. 31, 1900	5	$10,788
Year ending Dec. 31, 1902	6	11,001
Year ending Dec. 31, 1903	27	53,680
First six months 1904	25	86,804

No automobiles have yet been entered at Baltimore, and only few at Philadelphia (ten valued at $31,535 between Jan. 1, 1903, and March 18, 1904).

There are at present eighteen firms engaged in the importation of automobiles into this country. Considering that many of the cars in the customs returns are imported by private owners, the average number of cars imported this year by each firm will probably be about 15. Of course, a few of the larger concerns will import a much greater number. Estimating the domestic production of automobiles last year at 15,000, it will be seen that about two per cent. of the demand for cars in this country was supplied by foreign manufacturers. The following cars are now represented in this country: Mercedes, Panhard, Mors, Peugeot, Darracq, Decauville, Renault, Vinot et Deguingand, Richard-Brasier, Clement, Cudell, Adler, Fiat, Martini, Rochet-Schneider, Napier, De Dietrich, De Dion, Boyer and Benz.

An American gasoline car was brought to England as early as 1896, but the branch of the American automobile industry which first secured a market in Europe was the electric vehicle industry, which underwent a more rapid development here than abroad. American electric cars were introduced in Paris and London in 1899, and in 1900 at least three American electric vehicle manufacturers were represented in Paris. Although electric cars are still being exported, there is little doubt that the value of this class of exports has fallen off since 1902, owing partly to the improvement in the gasoline cars abroad and consequent decline in demand for electric cars, and partly owing to the advances of foreign manufacturers of electric cars.

In 1900 a start was also made in the exportation of steam vehicles, and a considerable proportion of the cars now exported from this country to all parts of the world are of the steamer class. Late in 1902 there was a perceptible falling off in the value of exports, which seems to be accounted for by a decline in popularity of light steam runabouts in England. Early in 1903 the export values increased again, however, and have been increasing ever since.

The export in light steam runabouts to England has almost ceased, but instead England now takes large numbers of American gasoline runabouts and some steam touring cars. The export of steam runabouts continues, however, to other parts of the world. During the past year (1903) there has been a rapid growth in the exports of gasoline runabouts, which appeal to the foreign buyer by reason of their low price, simplicity and freedom from noise and vibration. In 1901 the total value of automobile exports was $367,371; in 1902, $1,069,872; in 1903, $1,643,029, and during the first five months of 1904 $789,218. The value of the cars exported in 1903 was therefore about 63 per cent. greater than that of the cars imported during the year. The average value of the exported cars will hardly have exceeded $1,000, so that 1,600 cars were shipped from this country, or about five times as many as were imported. About the same relation between exports and imports obtains still.

The exports of cars are pretty well distributed over the entire globe, as may be seen from the following list of exports during the fiscal year 1902: Europe, $796,108; North America, $77,801; South America, $15,353; Asia, $22,832; Oceanica, $23,797; Africa, $12,637. Exports to individual countries were as follows: Great Britain and Ireland, $671,553; France, $59,051; Canada, $31,111; Mexico, $27,710; Germany, $24,491; the Philippine Islands, $14,216; South Africa, $12,637; Austria, $13,106; Argentine Republic, $10,203; Cuba, $11,152; Belgium, $7,797; Denmark, $9,905; Holland, $5,285; British Columbia $4,828; Peru, $3,000; China, $6,645; Japan, $9,513; British East Indies, $4,299; Italy, $2,200; Brazil, $2,150; Australia, $9,581; Bermuda, $1,500; Hong Kong, $1,175; Norway and Sweden, $1,697.

Among the largest exporters are the Olds Motor Works, the Locomobile Co. of America, the White Sewing Machine Co., the Waltham Mfg. Co. and the Cadillac Automobile Co. Some of these companies have agencies on all the five continents. The export business has undoubtedly been hampered considerably the present year by the inability of the manufacturers to satisfactorily meet the domestic demand, but, nevertheless, the exports have been very gratifying.

IMPORTS OF AUTOMOBILES INTO THE PORT OF NEW YORK.

Country.	1901. No.	1901. Value.	1902. No.	1902. Value.	1903. No.	1903. Value.
France	61	$175,362	279	$701,283	288	$897,639
Germany	..	......	6	17,927	11	18,522
England	..	......	13	26,665	8	33,468
Italy	..	......	3	4,443	3	8,020
Belgium	1	1,641	2	4,110	1	1,565
Cuba	..	......	..	......	1	1,700
Austria	..	......	1	3,177	..	......
Total	62	$177,003	304	$757,605	312	$960,914

On this year's model of the Werner motor a mechanism is provided for automatically cutting out every alternate spark when the clutch is thrown out, thus giving an easy reduction of speed which is useful in traffic. This is effected by introducing a second contact into the low-tension circuit when the reduction is required.

anical Ignition Generators--I.

By Albert L. Clough.

ovision of electric current for the f gasoline motors is a problem of it importance, as without a reliaeconomical source of supply, the of such engines becomes uncerexpensive.

y batteries, secondary or storage and mechanical generators, comagnetos and dynamos, constitute possible sources of the necessary energy among which a choice made. Sometimes a combination f these sources may be made use

nost all engineering questions, the to whether batteries or a generator r be used cannot be answered in erms, but depends upon circum-

OF DIFFERENT SOURCES OF CURRENT.

one buys a primary battery one a certain amount of chemical the potential form which may be into electrical energy as desired. l the chemical energy has thus verted, the battery is ordinarily and must be thrown away.

one purchases an accumulator, one a rather troublesome and shortice in which he may store a limitity of electrical energy obtained ne outside source, after the con- of which the accumulator may be

chasing a magneto or dynamo, one sing himself of a durable mechanthe conversion of a small fraction ower generated by the engine into energy, for the sparking of that He has become a manufacturer of y and is no longer dependent upon r his supply. This would seem to al condition, and it has long been of some engineers that the gasone should include integral with it ical generator, just as it should a carburetor. As the life of a ctrical generator should be nearly that of the engine which it sparks, the entire initial cost of the gen- hardly more than that of three sets of large-sized battery cells cadoing its work, it is apparent that of a mechanical generator constitery attractive proposition.

MAGNETO GENERATORS.

gneto generator consists of a small wound to deliver continuous curich is revolved upon a shaft bee poles of a steel horseshoe magnet been permanently magnetized. It simple arrangement, but, unless it nsiderable size, is unable to give an arge enough, for instance, to operump spark system of ignition.

ailure arises from the fact that the permanent magnetic field in which the armature revolves is necessarily weak in comparison with an electro magnetic field and is further weakened by the reaction of the armature current. On account of this weak field, the armature resistance is necessarily considerable, and cuts down the volume of the current very materially. One advantage results from the electrical peculiarities of the magneto, namely, it may be operated through a very wide speed range without dangerously excessive variation in the current produced. At very high speeds, at which a dynamo would generate a very high voltage and large current, the weak field of the magneto is distorted by a slight increase in the armature current to an extent sufficient to prevent the current output from building up to an unsafe point.

Its large armature resistance, too, tends to prevent such increase of the current output as the speed increase might otherwise be expected to cause. A magneto may thus be driven direct from the engine shaft at widely fluctuating speeds, and still deliver a current within the range demanded by the wipe spark system.

DYNAMO GENERATORS.

A dynamo differs from a magneto only in having field magnets of very soft iron or steel, wound with wire, through which circulates the whole or a portion of the current generated by the machine. The field magnets of such a generator thus become stronger and stronger the more current passes around them, and as the magnetic strength increases, the voltage of the current generated increases, and so on. A dynamo thus is not self-regulating for maximum output and, under some circumstances, it may be overheated or even burned out in an effort to furnish a current beyond its capabilities, on account of this faculty of automatically strengthening its own fields or of maintaining their strength with increased output.

If a dynamo field is wound in such a manner that a fraction of its current output is set apart to magnetize the fields, the faster it is run the higher voltage will be generated in its armature, and with the increase in voltage the greater current will pass through the fields, giving a still stronger induction in the armature, and so on, in a rapidly self-increasing manner.

SPEED GOVERNOR REQUIRED.

Dynamos, therefore, cannot be driven at the widely varying speeds met with in the operation of any gasoline engine, as at the highest speeds voltage destructive to the generator itself and the apparatus in connection with it would be produced, while at the lowest speeds the voltage developed might be quite inadequate. These generators thus require to be driven at an approximately uniform speed independent of the speed of the engine, and a regulating device is thus necessitated. The electrical output of a dynamo is very large in proportion to that of a magnet of the same size.

INTERMEDIATE TYPES.

Intermediate between the magneto and the dynamo is a form of machine having a permanent magnetic field around which are wound coils carrying the current output of the generator. These coils tend to maintain the field strength against the weakening effects of armature reaction, and give the machine somewhat increased power.

ALTERNATING AND OSCILLATING MAGNETOS.

Apart from the ordinary types of magnetos and dynamos which furnish a continuous current through the action of a commutator are two other classes of mechanical spark generators, namely, the oscillating or intermittent generator and the alternating current generator. The oscillating generator is a magneto the armature of which is capable of generating a sudden impulse of current when it is suddenly rocked on its shaft through the proper angular distance. This rocking action is usually effected by mechanical arrangements carried by the engine which periodically compress a spring. This spring, when released, imparts the desired oscillating motion to the armature. Releasing of the spring is effected by means of a mechanical adaptation of the timing device actuated by the half-speed shaft. The period of oscillation of the armature during which the current is generated is usually of such duration as to allow of a sufficient amount of change in the period of ignition being made.

CONSTRUCTION OF ALTERNATING MAGNETOS.

In the construction of the alternating current magneto generator no commutator is used, the current developed during each revolution consisting of two equal impulses of opposite direction separated by a zero point, and in order that the current may never be at zero when the sparking position is being passed, the generator must be geared to the engine which it is to spark, so that it may run at exactly the speed as the engine or at any direct multiple of this speed. If the gears are so meshed that the armature will be generating nearly its full current impulse when the engine reaches the sparking position, this relation will always be maintained, and the spark point never occurs when the generator is passing the zero point. The generator shaft usually carries the timer, which makes a quick break at the desired moment, and in order to time the spark the gear on the generator shaft and the contact breaker are capable of an angular displacement with the armature itself, by means of a cylindrical cam motion carried on the armature shaft.

Oscillating and alternate current generators are very little used in this country as yet, American practice thus far confining itself to the use of magnetos for operating wipe or contact sparkers and of dynamos for the operation of jump spark

systems. Special coils of properly proportioned windings are usually found necessary.

MOST ADVANTAGEOUS FOR MULTI-CYLINDERS.

A mechanical spark generator is of peculiar utility as the source of current for a large machine, on account of the following considerations: The engine of such a car is very likely to be of the three or four-cylinder type, and such a motor, requiring, as it does, two ignitions per revolution, would subject batteries to a very severe drain, especially at high speeds. The expense for batteries would be quite serious on such a car in comparison with that incurred in the operation, for instance, of a single-cylinder runabout with an ignition occurring only on every other revolution.

When run from the powerful engine of a large car, the power absorbed by the magneto or dynamo is hardly noticeable, but when it is attempted to apply a mechanical spark generator to a very small engine, the power which it demands is quite perceptible.

LOCATION OF GENERATOR.

A large car is likely to afford more accessible space in which a generator may be properly set up. The mechanism of all automobiles is generally badly crowded, but this is especially the case in small cars, and it is frequently impossible to find a space where a dynamo can be located in proper driving relation to the engine. While a battery may be carried in any out-of-the-way place, a dynamo or magneto must be so placed as to exactly line up with the balance wheel of the engine and still not interfere with any part of the mechanism.

With a large car, which generally has the advantage of the attendance of an engineer, the extra complication involved in the use of a generator and its driving mechanism is hardly worthy of consideration, while with a small runabout, which is cared for by its owner, any increase of what may already seem like a considerable degree of complication is to be sedulously avoided.

DRIVING ARRANGEMENTS.

A mechanical spark generator may be driven from the engine flywheel by means of a belt or a friction pulley, or it may be operated from a pulley on the secondary shaft or crank shaft by a sprocket or gear connection or by direct connection to the secondary shaft.

Connection by belt or friction pulley is not so positive as might be desired, as belts stretch, slip and break, and the operation of friction pulleys is likely to be affected by an accidental excess of oil. Sprocket or, still better, spur gear connection affords a very certain method of driving where it is otherwise applicable.

The magneto generator commences to generate current the moment that it is put in motion, and its driving ratio may be such that, at a very moderate engine speed, it may generate sufficient current to effect ignition, particularly if the touch spark method be employed. Fortunately, it is not likely to generate excessive currents at high running speeds owing to reasons previously stated. The very moderate engine speed demanded may in many cases be easily attained by means of the starting crank and the engine may thus start without a resort to any outside source of current.

BATTERIES FOR STARTING.

With the dynamo the condition is usually otherwise. Such a generator will not commence to generate until a very considerable speed is attained, as there will be no excitation of its magnetic fields. Furthermore, the range of speed within which it will generate a suitable current is quite restricted and a governor is required, as already stated. If matters are so arranged that the engine may be turned by hand at a speed sufficient to cause the dynamo to generate, it will prove difficult to secure a governor of efficiency and durability capable of holding down the speed at high engine velocities. Therefore, it is not usually attempted to start engines upon dynamo current, but an auxiliary battery is provided which serves as the source of ignition current only while the engine is being cranked. A switch is then thrown, either by hand or automatically, which disconnects the battery and connects the dynamo to the ignition circuits. This auxiliary battery may be a dry battery, which, being used so very little, ought to last a very long time; or it may be a storage battery which can be kept charged by the dynamo. Nevertheless the necessity of a battery is an objection, and probably deters many people from adopting the dynamo. One advantage of the auxiliary battery is that it will serve to spark the engine in case of accident to the dynamo.

At least one manufacturer of ignition dynamos produces a machine which is claimed to require no auxiliary battery for starting.

GOVERNORS.

For governing the speed of ignition dynamos, the centrifugal ball governor is generally used. The governor actuates mechanism which regulates the proportion of slip between the driving pulley of the engine and the driven armature of the generator. A clutch pulley or its equivalent is the mechanism employed.

Ignition magnetos and dynamos, being naturally carried in exposed positions, must be as far as possible water, oil and dustproof. Their armatures are therefore generally very well enclosed, and both armatures and fields should be well insulated. They should have liberal bearings to enable them to run at high speeds with safety, and should possess reliable means of lubrication. They must necessarily be of compact form, of a weight as light as consistent with strength and output, and they must be provided in most cases with sliding bases for use in regulating belt or pulley tension

Special care should be taken in regard to their commutators and brushes, in order to secure perfectly reliable current conduction under all circumstances and long life without readjustment. The voltage generated is so low that brush resistance, unless kept down to the lowest point, becomes a very serious if not a fatal factor in the operation of such machines, particularly in the self-excitation of the dynamos.

LIMITED PROGRESS IN APPLICATION.

Thus far the use of mechanical spark generators has made but very limited progress in this country, perhaps on account of the fact that the single-cylinder runabouts which form so large a proportion of American automobiles are very economical of battery, and for the reasons that "simplicity" is the watchword of many automobile users and manufacturers. Quite a number of American touring cars are equipped with dynamos and a very few with magnetos. However, it is to be presumed that as economic considerations begin to have more bearing upon the automobile art, mechanical electrical generators, designed as indispensable adjuncts of the engines which they spark will become common, if not almost universal, except upon the very smallest runabouts.

Exports for June.

The report of the Bureau of Statistics of the Department of Commerce and Labor shows that automobile and parts to the value of $181,798 were exported during the month of June, 1904. The amount in June, 1903, was $168,273. For the twelve months ending June 30, 1902, 1903 and 1904, the figures stood $948,528, $1,207,605 and $1,895,000 respectively.

Calendar of Automobile Dates and Events.

Aug. 4—St. Louis Tour (Toledo to Waterloo, Ind.).

Aug. 5—St. Louis Tour (Waterloo, Ind., to South Bend, Ind.).

Aug. 6—St. Louis Tour (South Bend, Ind., to Chicago).

Aug. 8—St. Louis Tour (Chicago to Pontiac, Ill.).

Aug. 9—St. Louis Tour (Pontiac, Ill., to Springfield).

Aug. 10—St. Louis Tour (Springfield to St. Louis).

Aug. 12 and 13—Kenilworth Track Race Meet, Buffalo, N. Y.

Aug. 15 and 20—Automobile Carnival at Long Branch, N. J.

Aug. 19 and 20—Glenville Track Races, Cleveland, O.

Aug. 21—Race Meet at St. Louis.

Sept. 16—Race Meet, Poughkeepsie, N. Y.

Oct. 8—Vanderbilt Cup Race.

The Automobile Club Argentino has been formed in Buenos Aires, Argentine Republic, and intends to organize a series of automobile competitions during the month of November next.

The St. Louis Tour of the American Automobile Association

At Poughkeepsie.

It was a rather slow night at the Nelson House in Poughkeepsie, the participants of the run sitting around the hotel and trading stories of their experiences en route. Over at the official garage the chauffeurs were hard at work getting their respective machines cleaned, oiled and in shape for the second day's run to Albany. It was reported that the roads were bad in places, and in view of the fact that it threatened rain, the entrants did not want to jeopardize their chances of a good run by any neglect of their cars.

The chain on the Buckmobile, which had been giving trouble during the day's run, was taken off and properly repaired and adjusted. This car is fitted with a muffler cut-out and raises an unearthly racket when starting off climbing hills. It was necessary to replace a shoe on the Pope-Toledo car, one of the tires having punctured and gone bad. The carburetor on the Yale car, which had been put out of business by striking a dog, was repaired and readjusted. This car is being watched with special interest, as it is fitted with solid tires, and many persons believed these would sink into muddy or sandy places and tie the car up for good. Whether this will occur or not remains to be seen. A new fan belt was made for the 70-h. p. Peerless car, which was also well overhauled, to prevent a repetition of the first day's over-heating troubles.

Word was received from A. R. Pardington, who was to make the trip in a Franklin car, that he had been called out on naval reserve duty, and would be unable to start at all. Miss Laura Lillibridge, who was a passenger on a White steamer, decided to leave the party at Poughkeepsie and return home, which she did. Mrs. Gillette accompanied her husband as a passenger in his Pope-Hartford car, and will continue on the run as far as Syracuse.

Early Tuesday morning Fred Brown, of Poughkeepsie, started off in a pilot car to scatter confetti, marking the roads toward Albany. The A. A. A. Committee had very wisely arranged to secure the services of some local automobilist at each night stop, who will pick out the best roads between cities, and mark them.

Poughkeepsie to Albany.

The participants in the run were astir bright and early Tuesday morning, ready for the start, and lost no time getting over to the garage and tuning up their cars. Webb Jay (White), had been troubled all day Monday by a leaky water pump, and took occasion to take out the old pump and put in a new one while at the garage. This is the same car driven by him in the Pittsburg endurance run last fall. On the Royal Tourist the steering connections were tightened. The Buckmobile completed arrangements first, and started for the Nelson House. The others followed shortly after, and at 8 o'clock the start was made, the following going out:

A. L. Pope, Pope-Toledo; Ray D. Lillibridge, White steamer; H. C. Esselstyn, Franklin; Augustus Post, White; Carl Page, White; C. H. Gillette, Pope-Hartford; W. B. Hurlburt, Cadillac; A. J. and J. W. Seaton, Buckmobile; Webb Jay, White; C. W. Birchwood, Haynes-Apper-

START FOR THE ST. LOUIS TOUR FROM FIFTH AVENUE AND 59TH STREET, NEW YORK CITY.

son; D. B. Huss, Oldsmobile; B. C. Swinehart, Yale; A. D. McLaughlin, Royal; R. M. Megargle, Elmore; R. P. and C. S. Scott, Peerless.

It had been threatening all Monday night, and early Tuesday morning the rain came down in torrents, churning the roads into a muddy mass. The roads from Peekskill to Poughkeepsie had not been marked, and this caused some confusion. A detour was made before Peekskill, to avoid the notoriously steep Nelson hill. From Fishkill the river road was followed, and it was not in extra good condition. Tuesday's run was over fairly good roads, from Poughkeepsie to Hudson at noon, and thence to Albany, a total distance of 74 miles. However, a very bad stretch of road five miles out of Albany was reported, in a telegram received late Monday night from Lee Strauss.

A telegram received from New York Tuesday morning stated that several cars would start from there and try to overhaul the main party at Buffalo. Among these are expected Mrs. S. D. Malpas, Panhard; Dr. W. J. Martin, Autocar, and Eugene Hall, Knox. At Poughkeepsie Monday evening ten of the tourists applied for membership in the A. A. A., and a large number of others will also come in before the run ends, it is expected.

The sky was overcast when the contestants started off Tuesday morning, much to the annoyance of the camera men. The rain held off, however, and later the sun endeavored to break through, and dispelled the fear of a repetition of last fall's endurance contest experience.

THE TIRES IN THE TOUR.

The tire companies are not furnishing any of the contestants with free tires for the sake of advertisement to be secured. This practice which prevailed during the New York-Pittsburg and earlier endurance contests, is entirely cut out here. The equipment of tires on the different cars may be seen from the following list:

Goodrich, Nos. 1 (rear), 10, 21 (rear), 30 31, 32, 34, 57.
Diamond, Nos. 4, 24, 47, 53, 60, 61, 77.
G. & J., Nos. 3, 21 (front), 55, 59.
Michelin, Nos. 1 (front), 42, 50, 56.
Fisk, Nos. 38, 39 (rear).
Goodyear, No. 14.
Swinehart, No. 58.
English Dunlop, No. 15.
Continental, No. 39 (front).

ARRIVAL AT ALBANY.

The run by train to Albany was a short one, but the officials had hardly arrived when the first car came rushing up to the Ten Eyck Hotel, it, as well as several others, having come through without making a halt at the noon stop at Hudson. The roads were found to be in good condition, there having been no rain from a few miles beyond Poughkeepsie. Among the earlier arrivals were the Buckmobile, the Pope-Toledo, the White cars, and the Franklin driven by Esselstyn. The latter reported a delay of 40 minutes at Hudson, where he had assisted Secretary Gillette, stalled with a broken exhaust valve.

Messrs. John Newell, Frank S. Howell and Frank H. Fish, Jr., a local committee representing the Albany A. C., left the city at 1 o'clock, accompanied by several local machines, to meet the visitors at Schodack Center, where the post roads from Boston and New York cross each other. The committee carried bags of confetti to mark the route into the city. Arrangements were also made with farmers along the road to hang lanterns along the route to guide those who might be coming along at night.

The Albany A. C. issued a carte blanche invitation to the participants in the run to visit their club headquarters during the evening, where they kept open house. Mayor Gaus, of Albany, greeted the party upon their arrival, and sent by one of its members a message to Mayor Wells, of St. Louis, congratulating him on the success of the Fair.

It was reported at the Ten Eyck on Tuesday evening that the Yale car, driven by Mr. Swinehart, was down and out twelve miles from Hudson, N. Y. It seems that a careless mechanic had left a lathe tool of some sort in the gear box of his car when preparing the machine for the run. This worked around and finally dropped into the gears, smashing them beyond repair. Swinehart immediately realized the seriousness of his plight and forthwith arranged to have the car put aboard a train and shipped to Toledo for repairs at the Yale factory. He wired Manager Kirk to either arrange to repair the machine, or to have a new car fitted with solid tires ready for him there, so that he could continue the run to St. Louis from that point. This was the first car to be put out of the run, and the news of the mishap was received with general regret.

PLAYING THE GOOD SAMARITAN.

One of the autos on the tour was unexpectedly turned into an emergency ambulance and conveyed an injured man to the hospital in record time. Ray D. Lillibridge, driving his White car near Hudson, N. Y., was stopped by a farmer, who rushed out of a house and explained that a man with him had injured his hand by cutting off his right index finger. Weak from loss of blood, the fellow needed immediate medical attention, and as there was no doctor nearer than Hudson, three miles away, Lillibridge at once put one of his passengers out of his car and into the next car behind, and then rushed the sufferer to the hospital at Hudson.

Webb Jay, who ran short of water for his White car, had an odd experience in searching for that most necessary fluid. He drove into a farmyard and stopped at the pump, where he was just about to fill his tank when a woman rushed out of the house nearby and ordered him to drop the pail, saying that she didn't want any "road hogs" to get anything at her place. Mr. Jay very respectfully and earnestly informed the woman that he must have the water at once, as his car was likely to blow up any moment and annihilate everything within sight. The woman, thoroughly frightened, made a rush for the house, and Jay filled his tank and continued on his way rejoicing.

Elliot C. Lee, who was to drive a White steamer from Boston, Mass., to Albany, dropped out of the run at Pittsfield, Mass. A heavy shower came up, and believing the rain was to continue all day, he gave up the trip and returned home by train. Mrs. Susan D. Malpas started from New York City with two lady friends and two chauffeurs in her 25-h. p. Panhard car on Tuesday morning early. She had a slight mishap several miles outside Albany, bending a steering rod. This was taken two miles back to a blacksmith shop for repairs. The rod was finally fixed and replaced in the car, which continued, and arrived at Albany at 11:15 p. m. James M. Waters, driving a 24-h. p. Panhard, started from New York on Tuesday morning, and reached Albany at 8:05 p. m.

Tuesday Night at Albany.

Few repairs were made at the Taylor Auto Co.'s garage and R. Robinson's garage where the cars put up for the night. Fire Chief Higgins, of Albany, visited the garages and insisted that they keep all windows open, in order to prevent any possible explosion from escaping gas. The Chief, no doubt, thought that the tourists used a particularly explosive sort of gasoline.

The men who had come in over the New England route reported the roads in horrible condition. Mr. Lowe experienced severe tire trouble, having four inner tubes blown out. A driving chain on Harlan W. Whipple's car also gave some trouble, and had to be readjusted at the garage.

Mrs. Malpas decided not to continue in her car, as the machine was not properly equipped for a long run. Her chauffeur reported that the accident they had experienced was caused by running into a ditch, as a result of a rut in the road. Several of the members of the Boston party reported narrow escapes from skidding accidents. The roads were in bad condition from the rains, and the country is mountainous, with the exception of about thirty miles between Springfield and Albany. The hill at Chester, Mass., is one of the steepest in that part of the country, and proved a poser for some of the cars. Another between Pittsfield and Lebanon was found to be equally bad.

REAL AMERICAN TERMS.

While the tourists were idling about the Ten Eyck, a spirited discussion arose over the new movement to get rid of the numerous French terms in describing automobiles and automobile operators. The general sen-

timent was in favor of the adoption of plain English terms and the substitution, as suggested by Mr. Whipple at Mount Washington, of the word engineer for mechanician or chauffeur, motor car for automobile, motorist for automobilist, and motor house for garage.

Albany to Utica.

The contestants Wednesday morning were up early, to prepare for the longest day's run since the tour started. One hundred miles were to be covered, by way of Schenectady, Amsterdam, Fonda (noon stop), Fort Plain, Little Falls and Herkimer. At 6 o'clock the sky was overcast, and rain threatened, the same as all the other days since New York was left. An hour later, however, the sun came out, and there was every promise of a pleasant day.

The cars were all brought from the garages and backed up against the curb in front of the Ten Eyck, where they were photographed. The first of them left shortly after 7:30 o'clock, in order to be able to make an early finish. Harlan W. Whipple, having heard that bad roads were to be met, purchased a shovel and several yards of rope, in anticipation of possible trouble when his heavy Mercedes plunged into muddy ruts. It was 9 o'clock before all the cars were off, the following having started:

Harlan W. Whipple, Mercedes; C. H. Gillette, Pope-Hartford; Carl Page, White; Augustus Post, White; R. P. Scott, Special Peerless; C. J. Glidden, Napier; H. Frederick Lesh, Pope-Toledo; C. W. Birchwood, Haynes-Apperson; George H. Lowe, White; Ray D. Lillibridge, White; Webb Jay, White; P. F. Megargle, Elmore-Pathfinder; W. C. Hurlburt, Cadillac; F. H. Manross, Columbia; H. C. Esselstyn, Franklin; James M. Waters, Panhard; Percy P. Pierce, Pierce Great-Arrow; D. B. Huss, Oldsmobile; Harold L. Pope, Pope-Hartford; A. J. Seaton, Buckmobile; A. B. McLoughlin, Royal Tourist; F. W. Richards, Phelps; Geo. Soules, Pope-Toledo.

Mr. Seaton left Albany early Tuesday night, to get to Utica early, it being his home town. When the committee that traveled by train reached Utica, they found him waiting there wtih three cars, which he placed at their disposal. Mr. Mundy, of the Miller-Mundy garage, where the cars were to be stored, was also on hand with a car for the use of the committee.

The cars began to arrive shortly after 1 o'clock. H. C. Esselstyn, Franklin, reported passing Carl Page on the road stalled by lack of gasoline. Harold L. Pope, while driving along near Fonda, had his steering wheel jerked out of his hand when the front wheels dropped into a rut, and the car went down a gulley before it could be stopped. Mr. Ziegler, of Hartford, who was a passenger in the car, was thrown out and bruised, but, luckily, he was not badly hurt. Mr. Pope at once got to work, and, jacking up the car, took out the front axle, which was badly bent. He secured a farm wagon to take him to the nearest blacksmith shop, to get the axle straightened; then returned and put it back in place and continued toward Utica.

No. 24, the Haynes-Apperson entry, was delayed by lubrication troubles. The car had to be driven carefully, as the axle had been bent during the hill climbing contest at Mount Washington.

Considerable adjustment and repair work was done at the garage. The valves were taken out of the Franklin car and the cylinders washed out with gasoline. There had been a loss of power due to lack of compression, and this was found to be due to the fact that the exhaust valve set nuts had loosened up. Pope-Toledo No. 21 had a new outer shoe put on the rear wheel, one having blown out. The Royal Tourist engine had been skipping spark, and the ignition was gone over carefully. The grease cup feeds on Mr. Post's White steamer were also overhauled, some of them being stopped up. All the cars were washed and thoroughly lubricated and inspected.

Scene at the Start in New York City.

All the starters from Albany had reported at Utica at 6:30 o'clock, with the exception of No. 34, Elmore; No. 14, Special 70-h. p. Peerless, and No. 55, Pope-Hartford. The roads were found to be in horrible condition for the greater part of the day's run, and the participants were loud in their condemnation of the action of county authorities who allowed such roads to exist. Mr. Glidden stated at the Baggs House that the roads were in worse condition than any he had ever gone over in all his touring experience.

By 8 o'clock only the special 70-h. p. Peerless car was still missing. This machine had been in almost constant difficulty since leaving New York, owing to the fact that the round leather belt driving the fan had broken, and they had been unable to

secure a new one that would do the work properly.

AN ENDURANCE RUN EXPERIENCE.

This was not their trouble on the run from Albany to Utica, however. Shortly before midnight on Wednesday it was learned that the big car had skidded off the road over an embankment and down a gulley, where it was mired. No further word was received from Mr. Scott or his party Wednesday night, but shortly after 6 o'clock on Thursday morning they pulled up to the hotel, tired, bedraggled and mud-covered. Mr. Scott explained that owing to the delay occasioned by waiting for a new fan belt to be made, he had not left Utica until 3 p. m. Just ahead of him a heavy storm had broken, and when he reached Fort Plain the roads were a muddy mass. It was difficult traveling in the dark, and the party moved along slowly.

When about five miles out of Utica the car suddenly skidded over the embankment and settled in mud up to the hubs. The machine landed in a rather fortunate position, for had it slid down the bank ten feet more, it would have struck another deep gulley, and in all probability have overturned. As soon as the car settled into place, Mr. Scott and the others jumped out and began to look about in order to decide what course would be best to pursue. They were in a quandary as to what to do, when a native happened along, and, noting their plight, informed them that a professional house mover lived about half a mile down the road and he would in all probability be able to help them.

A messenger was sent to the man's house at once, and after considerable parleying he was finally induced to get up out of bed and come to the assistance of the stranded motorists. He harnessed a team of horses, and with block and tackle drove to where the car lay hors de combat. It was necessary to prop up the big 3,600-lb. car with blocks to prevent it from slipping down the second gulley. After two hours or more hard work, the tackle was properly rigged and the car was drawn back on the road. The machine was thoroughly inspected, and it was found that beyond bending one of the rear axles slightly, no damage was done. The machine continued under its own power to the official headquarters at the Bagg's Hotel, and Mr. Scott and his party, instead of retiring, had breakfast and decided to undertake the run to Syracuse and go to bed there.

NEW YORK'S BAD ROADS.

The springs on most of the cars were flattened considerably, and some were broken by the terrible jolting of the run from Albany. Three leaves in the rear springs of Mr. Glidden's Napier car were broken, and Webb Jay was obliged to insert a new rear spring in his car. The participants of the run were scathing in their denunciation of the men who allowed such horrible road conditions to exist, and this indignation developed into a unanimous protest from all the tourists, embodied in the following letter to Governor Odell, of New York State, which was signed by all on the run and will be sent to the Governor at once:

"The undersigned citizens of the United States and members of the American Automobile Association, crossing the Empire State, en route to St. Louis, highly commend the work done by the State in road making in some sections, but desire to call your attention to the deplorable and dangerous condition of the road on the main thoroughfare between Albany and Buffalo, more particularly that section passed over to-day, between Albany and Utica. It is undoubtedly true that throughout the civilized world there does not exist roads in such wretched condition that connect so many important cities and towns."

A telegram was received from President Brown, of the Syracuse A.C., extending an invitation to all persons on the tour to attend a dinner given by the club in connection with the H. H. Franklin Mfg. Co., a trolley ride in special cars and a theatre party. President Whipple, of the A. A. A., wired his acceptance and thanks on behalf of all the tourists on the run.

The Bagg's Hotel is unfortunately situated, and the noise of the trains kept most of the men awake. They were consequently up early on Thursday morning, many of them breakfasting at 6 a. m. Mr. Esselstyn, (Franklin), desired to get into Syracuse, his home town, first, and therefore started early, the others giving him the preference.

The route out of Utica was changed slightly, and early Thursday morning F. P. Miller and H. F. Smith, of Utica, with H. H. Smith, of Syracuse, started over the course to scatter confetti. The run was only 49 miles, the shortest of the trip.

The Mayor of Utica, Mr. Talcott, following the example of the Mayors of other cities en route, decided to send a message to Mayor Wells of St. Louis, and A. J. Seaton, who drives a Buckmobile manufactured at Utica, was selected as the bearer of the missive.

The starters from Utica were: Whipple, Mercedes; Gillette, Pope-Hartford; Wansson, Peerless; Lesh, Pope-Toledo; Birchwood, Haynes-Apperson; Lillibridge, White Steamer; Megargle, Elmore; Waters, Mercedes; Huss, Oldsmobile; Richards, Phelps; Esselstyn, Franklin; A. L. Pope, Pope-Toledo; Seaton, Buckmobile; Jay, White Steamer; Page, White Steamer; Post, White Steamer; Manross, Columbia; McLaughlin, Royal Tourist; Glidden, Napier; Hurlburt, Cadillac; Lowe, White Steamer; H. Pope, Pope-Hartford.

Mr. Whipple stayed behind the main crowd and traveled with the big 70-h.p. Special, in order to be near at hand to help the car should it get into trouble. All the

THE START FROM POUGHKEEPSIE, N. Y.

others sprinted over the 49 miles of road at a lively gait.

It threatened rain when the first car started, and before they were ten miles out of Utica a heavy storm broke. The roads were rutty and muddy, and the springs on the cars suffered again. On this trip "Pop" Lowe broke a rear spring. The Haynes-Apperson car went over an embankment, but landed right side up. The engine never stopped and the car, uninjured, pulled out under its own power. There were several skidding accidents and narrow escapes.

At Syracuse.

After lunch at the Yates House, a number of the tourists were taken out in machines by the members of the Syracuse A. C. and shown the town. Others went out to the Franklin Manufacturing Co.'s factory, an invitation having been extended to all on the run to inspect the works. Every participant of the tour on arriving at the Yates House was presented with a handsome souvenir badge bearing the club emblem of the Syracuse A. C. in blue and gold on celluloid. Two streamers—one red and one blue—bore in gold letters the words "St. Louis Tourists. Welcome. July 28 and 29." The members of the club were all extremely kind and courteous, and under the direction of Carl A. Amos, chairman of the reception committee, did everything possible to make things pleasant.

Many of the drivers of cars spent the afternoon at the garage looking over their machines, all of the autos beginning to show signs of the hard work they have done. Mr. Lowe's White has a broken spring and Webb Jay had some tire trouble, a nail having punctured a rear tire. The 70-h.p. Peerless, despite its bent axle and the trouble caused by overheating of the motor, reached the garage in good time, making the run of 50 miles from Utica to Syracuse in three hours. Some of the cars were pushed through in much less time, despite the bad conditions of the roads, which accounts for the breaking of springs. Notwithstanding Mr. Whipple's letter requesting that speed ordinances be observed throughout the run, some of the cars at times hit up a 40 and 45 mile an hour clip, and that there is no little racing is undeniable.

Accidents have been avoided to date. It was unofficially announced to-day that the new Stearns and Winton 1905 cars would enter the run at Cleveland, and the general impression seemed to be that there would be many speed records broken when they started off in rivalry for the distinction of being "first in" each day.

In most of the cars the mud has found its way into the bearings and is beginning to grind a prophesy of busy times for the repair men at St. Louis, or perhaps before. A great deal of trouble has been experienced as a result of mud getting into the steering connections, causing the cars to handle with difficulty. Many of the drivers are securing canvass to make covers, such as the imported cars use to protect these parts. On the chain-driven cars the mud has got in its work, and most of the chains have had to be tightened. D. B. Huss, Olds tonneau, and others on the run have complete extra chains along, which will no doubt be put on before the end of the run.

ENTERING ALBANY OVER TOLL BRIDGE.

The weather was rainy on Thursday afternoon, and this drove many who would ordinarily have gone out riding in the machines to the garage. They sat about discussing the various machines and swapping road experiences. All seemed to think that the run would result in great good to the industry and help along the good roads work. There was much comment on the kindness and courtesy of the farmers along the routes followed, and all were enthusiastic over the treatment they had received.

Late in the afternoon Mayor Alan C. Fobes, of Syracuse, decided to send a message to Mayor Wells, of St. Louis. Secretary Tucker, of the A. A. A., will carry the letter, which is officially sealed with the seal of the city of Syracuse, and makes quite an imposing document.

Mr. Huss, Oldsmobile, was among those who experienced bad skids during the run to Syracuse. His driving chain had broken while coming down a steep hill, and he had applied the hub brakes so quickly that the rear wheels locked and the car slid down into a gulley. Luckily it was not injured, and after the chain was fixed he was able to proceed. Mr. Huss was also troubled by his low-speed gear getting out of adjustment so that it would not engage properly, and he was consequently obliged to rush all the hills encountered and make them on the high gear.

Late Thursday night an entire new front axle and steering gear arrived by express for Harold Pope's Pope-Hartford car. The old axle was badly bent when the car was ditched on the second day's run, and was not considered safe.

Harlan W. Whiplpe, who had not started from Utica until late Thursday afternoon, arrived in Syracuse shortly before 6 o'clock in the midst of a pouring rain. He was given an ovation by the men in the hotel lobby, who had feared that he was in trouble on the road and would be unable to get in in time to be present at the banquet given in the evening.

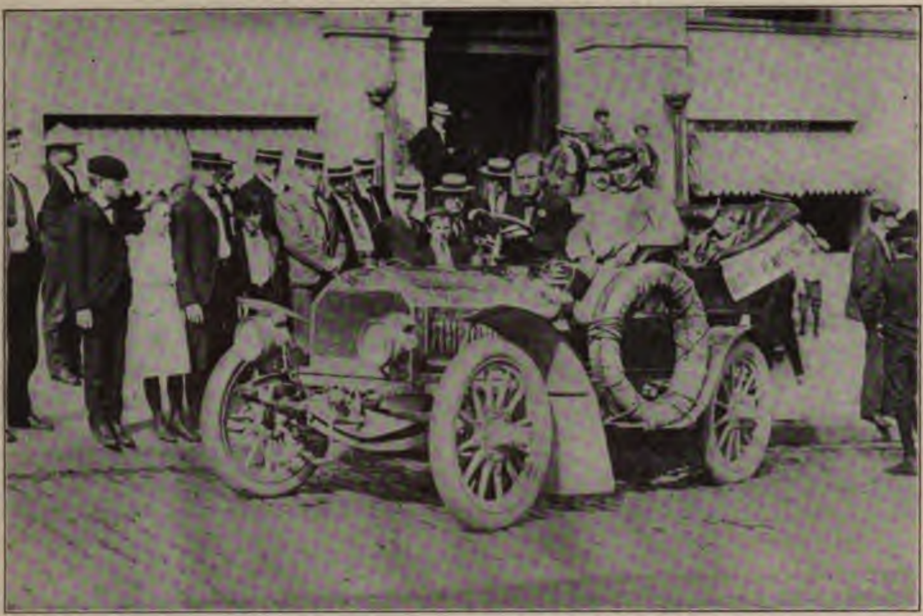
The Megargle boys, driving the Elmore Pathfinder on their second tour to St. Louis, put their car in a shop at Utica, and, removing the body, overhauled the engine and other machinery thoroughly. Everything was put into good shape and the Megargles now believe their car is equal to anything in the run for endurance qualities.

At 6 o'clock the tourists, excepting the ladies in the party, were escorted to the banquet hall of the Yates House, where a dinner was served to them. President Willet H. Brown, of the Syracuse A. C., welcomed them on behalf of the club, Giles H. Stillwell, for the Franklin Company, and Mayor Fobes for the city of Syracuse. The menu prepared was a most excellent one, containing such tasty dishes as air-cooled green turtle soup, double-cylinder clams, jump-spark sauterne and gasoline cocktail. After the good things provided had been disposed of several addresses were made, the speakers being President Brown, of the S. A. C.; Mayor Fobes, of Syracuse; Albert L. Pope, Harlan W. Whipple and Augustus Post.

At the close of the dinner the party boarded special trolley cars and were taken out to the Varley Theatre, where they witnessed a performance of the comic opera, "Fra Diavolo." They arrived back at the hotel shortly before midnight and bade each other a rousing spiritus frumenti farewell, all voting the Syracuse Club and Franklin men jolly good fellows.

Syracuse to Rochester.

Despite their dissipation, the tourists were all on hand bright and early on Friday morning, ready for the start over the



PERCY PIERCE, PIERCE GREAT ARROW ON HIS ARRIVAL AT ALBANY.

roads to Rochester. The sun was shining brightly, giving every promise of a pleasant day's run, but all remembered the heavy rains of Thursday and realized that the roads would be muddy and sticky. It was decided not to follow the original road laid out by the tour committee, this being reported to be in very bad shape, and at 5 o'clock Harry C. Pierce, a member of the Syracuse A. C., started out in his touring car to scatter confetti to mark the new route selected. He was accompanied by H. W. Smith, of the touring committee, and W. A. Fancher, a well-known Syracuse auto enthusiast

Before 7 o'clock a dozen or more of the tourists were under way, among the early starters being Mr. Seaton in his Buckmobile, Mr. Esselstyn in his Franklin, and Frederick H. Lesh in his Pope-Toledo. The complete list of starters follows:

Harlan W. Whipple, Mercedes; C. H. Gillette, Pope-Hartford; Carl Page, White; R. P. Scott, 70 h. p. Peerless; Chas. J. Glidden, Napier; H. J. Lesh, Pope-Toledo; C. V. Birchwood, Haynes-Apperson; Carl Page, White; Geo. H. Lowe, White; Ray D. Lillibridge, White; Webb Jay, White; P. F. Megargle, Elmore; W. C. Hurlburt, Cadillac; F. J. Manross, Columbia; H. C. Esselstyn, Franklin; Jas. M. Waters, Panhard; Percy Pierce, Pierce Gt. Arrow; D. B. Huss, Oldsmobile; Harold L. Pope, Pope-Hartford; A. J. Seaton, Buckmobile; A. D. McLaughlin, Royal Tourist; George Soules, Pope-Toledo, Augustus Post, White.

Thoroughly bedraggled, the tourists arrived at the Powers House in Rochester after a ninety-two-mile plow through roads covered with greasy, slippery mud. Their faces, hair and clothing were plastered with splashings of the innumerable mud puddles through which they had traveled.

A large crowd had gathered at the hotel to await the coming of the cars, and they took no pains to disguise their amusement at the condition of the tourists, greeting each car with cheers and loud laughter as it approached and its occupants dug a little of the mud off themselves before entering the hotel. A dirtier looking lot of tourists could not be imagined, and those in the cars were surprised to see how mud-splashed they were.

A detour was made from the regular route, in order to avoid the Montezuma swamps, which were said to be overflowed and in an impassable condition, but there was also plenty of mud on the other roads, as the condition of the tourists proved. Despite the fact that all the cars made an early start, the greater number were late in finishing the trip. The day was a fine one, and many of the tourists, contrary to their usual custom, stopped for dinner en route. The noon stop was at Lyons, where the tourists were well received.

Harry C. Pierce, who preceded the tourists to scatter confetti, was not out far when he found it necessary to put chains on the driving wheels of his car to give them sufficient traction in the heavy mud. Those who followed him found the same course necessary, and the back wheels were fitted up with chains, straps and rope. Farmers along the road in many cases sold their clotheslines for this purpose. Mr. Pierce reached the Powers House at 1 o'clock, and a short time later the first of the participants in the tour drove up. A. J. Seaton, Buckmobile, who was among the early arrivals, reported that he had been delayed by his driving chain snapping. There was a lull after Mr. Seaton's arrival until 2:30 P. M., when A. D. McLaughlin came in driving the Royal Tourist. J. N. Manross came half an hour later in his big Columbia car. He was followed by Webb Jay in his White steamer. The other starters came along at irregular intervals, and were divided among the J. J. Mandery garage on South avenue and the Rochester Auto Company's place, 189 West Main street.

The cars, upon arriving at the garage, were at once washed up, and had their tanks, oilers and grease cups filled. All the operators were tired out, as the run had been a hard one, but they promised an early start for Buffalo on Saturday morning. All entered have come to the conclusion that it is better to get away early and allow for possible troubles and breakdowns en route. It was decided to have all tanks filled as soon as cars reached the garage, as considerable confusion resulted at Poughkeepsie, Albany and Utica when all the men reached the garage at about the same time in the morning, and were clamoring for gasoline and other supplies.

Mr. Lillibridge, White, was taken ill at Syracuse, and was unable to put his car through to Rochester. The machine was driven by Mr. Sonnanstine, of the White Company, Mr. Lillibridge making the trip by train.

A number of cars were stalled during the day's run as a result of lack of gasoline, the operators having neglected to fill their tanks. Among these was Esselstyn, Franklin, who had a good deal of trouble securing enough of that necessary fluid, as did the others. It seems that while Esselstyn was stalled, Percy Pierce came along, and in order to help out, let him have about a quart of gasoline. He then kept near the Franklin until this supply was exhausted, when he gave up another quart. The two cars then continued, Pierce going ahead. At the next town reached, Esselstyn came across Pierce stuck, his gasoline supply having given out. The Franklin at this time also exhausted its supply of fuel, and the drivers of both cars went off in search of "essence." They managed to locate four gallons of the fluid, and, dividing it between them, both managed to get to the official auto house at Rochester.

Mr. Whipples' Mercedes car was also late finishing, being delayed by tire troubles. Mr. Lowe, White, was also held up by his gasoline supply giving out. Another car coming along with an auxiliary tank helped him out.

Mr. Hurlburt's Cadillac car met with disaster twenty-eight miles out of Rochester, at East Palmyra. A knuckle joint broke, letting the car down with a smash that buckled the front axle. A messenger was sent by train to Rochester to get a new knuckle, which, when it arrived, proved to be for the wrong side. He managed to hammer it into shape so that he could use it to run into Buffalo with, where he arrived at 10 o'clock, and then his mechanic worked the best part of the night putting in a complete new axle, so that the car would be ready for an early start.

The Elmore Pathfinder also had its mishaps and troubles. The Megargle boys started out of Syracuse early Friday morn-

ing, intending to be first into Rochester, that being their home town. They had gone about twenty miles when their commutator spring broke. This was repaired, and a short time later they were tied up again as a result of spark troubles. Straightening this out, they continued, and in passing over a hump in the centre of the road the brake rods fouled, and were torn away. This left the car without a brake, and the reverse was used, but did not hold well.

A short distance further on they overtook the Pierce Arrow. Percy Pierce suddenly held up his hand for them to stop, at the same time slackening the speed of his own car. Megargle jammed on the reverse, but could not stop. Neither could he steer out of the way. He slackened the speed of his car so that the crash was not a very heavy one. The radiator on the Pathfinder was crushed slightly, but no other damage was done. The car finally reached Rochester at 5 P. M., and after supper was put in shape at the garage for the run to Buffalo on the morrow.

The Haynes-Apperson car had considerable trouble with the ignition and lubrication system, and these were thoroughly overhauled at the garage on Friday night.

Mr. Gillette, Pope-Hartford, was delayed by a puncture. Mr. Lesh's Pope-Toledo was tied up a few miles out of Rochester by the lugs in one of his rear tires breaking. New lugs were sent out to him by a messenger, and he reached the official headquarters at the Powers House at a late hour.

D. B. Huss and Ed Spooner reported having had a good time en route. They were invited to attend a lawn party at a farm house they passed, and upon accepting, were made the guests of honor. In return they took out several parties for short rides in their Olds tonneau before resuming the trip to Rochester.

The big Peerless special was delayed by tire troubles, having cut a rear shoe badly. Mr. Richard's Phelps car was also delayed by tire troubles.

There had been no plans made by the Rochester automobilists for the entertainment of the tourists, and most of them turned in early to get rested up and ready for the last day's run of the first week and a triumphal entry into Buffalo, over four hundred miles from the starting point.

It was stated that many of the tourists had paid at Syracuse to have their tanks filled with gasoline, but this had been neglected at the garage, and in consequence the cars ran low in fuel.

Eight additional entries have been received for cars to enter the run after Cleveland is reached. Numbers will be assigned to these, and the entries will be officially announced later.

Among the many pleasant incidents of the trip from Syracuse to Rochester was the extreme courtesy of the residents in the towns and country passed. Charles J. Glidden stopped at a small place near Lyons, N. Y., and in an instant his car was surrounded by curious persons. Mrs. Glidden was handed a pretty bouquet, and Mr. Glidden received a large basketful of luscious red cherries. In order to show his appreciation, Mr. Glidden piled his big car full of children and gave them all a short ride, very much to their surprise and pleasure. The other tourists were also well received, and many of them took women and children for short rides through the various towns; that is, the men who were not racing to win the newspaper notoriety of being first in at the various night stops.

Mr. Lesh, Pope-Toledo, stated at the Powers House Saturday morning that the report that he had been delayed by tire trouble on the run to Rochester was erroneous, his car, no doubt, having been mistaken for one of the others.

A number of the tourists called on Mayor Cutler of Rochester Friday afternoon and took from him a letter of greeting to the Mayor of St. Louis, stating that the autoists had stopped at Rochester on their way to the Fair.

That the prejudice against automobilists is fast passing away is demonstrated and proven by the fact that there has not been a single case in which discourtesy has been shown to anyone on the run. The farmers are universally kind and considerate and in many country places have decorated their house, their arms filled with water lilies and an unusual sight to come across a bevy of pretty girls standing in front of a farm house their arms filled with water lilies and pretty posies, which they throw to the occupants of the cars as they go past. It is highly gratifying to note this, as it will mean greater comfort in touring when the farmers feel friendly toward the users of horseless vehicles and view them as well-meaning and law-abiding men, desiring but a share of the road and considerate of the rights of others. President Whipple, of the A. A. A., spoke of this friendly feeling at the banquet in Syracuse and impressed upon the minds of the tourists the necessity of observing the speed laws and giving the man with the horse every possible chance to drive in safety along the highways. Mr. Whipple has no doubt experienced a change of ideas, however, as he runs a very powerful car which he himself says has been driving close to the mile-a-minute mark. If consistency is a jewel, Mr. Whipple is perfectly gemless in this instance.

A number of the manufacturers who have cars entered are sparing no money in order to insure the machines getting through in good shape. The White Sewing Machine Company, for instance, will spend thousands of dollars in getting their machines to the finishing point. They have special trunks filled with springs and such parts as are likely to give out in ordinary touring work, which are shipped each day to the night stops.

The White Company also looks after the welfare of its fifteen men traveling in or interested in the welfare of their five cars. They have a special advance representative, Francis H. Phillips, of Harvard University, Boston, who goes in advance each day and arranges hotel accommodations for the party. Mr. Phillips is a hustling and progressive young man, and, thanks to him, the White men have the best the land affords. He is one of the "Mud Larks," having filled this same important position on the run to Pittsburg last fall.

The Black Diamond Auto Co., makers

WEBB JAY IN HIS WHITE STEAMER.

of the Buckmobile, have a special representative traveling by train in advance each day. He carries a grip containing an extra coil, valves, spark plugs and such other small parts as may be needed during the run.

The Franklin Company have two extra driving chains in their car and extra plugs and valves, as well as tires. They trust to luck and driver Esselstyn for the rest. Mr. Hurlbert has taken the precaution of having an extra spark coil placed on the dash.

Rochester to Buffalo.

Saturday morning dawned fair and clear and at five o'clock some of the machines were ready for the start. It had been agreed that Percy Pierce should be allowed to enter Buffalo first, it being his home town, and he made an early start for that purpose. Lee Richmond and J. J. Mandery, of Rochester, who were to lay the confetti trail to Buffalo, left an hour before Pierce. The route followed was along the State road via Scottsville, Le Roy and Batavia, the latter place being the noon stop. The roads were found to be in good condition, and the best yet met on the run. All the contestants took advantage of this to speed their cars to the limit.

It was 9.30 o'clock when the pilot car pulled up at the Iroquois hotel, and a short time after the first of the tourists came in. The car was immediately surrounded by a curious crowd, who asked all sorts of questions. The camera artists also began to get in their work, as did the irrepressible small boy. The official signs on all the cars are closely penciled with names and addresses of persons in the various towns passed through, it being quite the fad to mark them up.

At 10.30 the Cadillac arrived, and the others straggled in at irregular intervals, the entire quota that left Rochester finishing at Buffalo.

Four hundred and fifty-four miles out of New York and with 804 miles still to go before reaching their destination at St. Louis, the tourists were glad to leave their cars at the garage of the Centaur Motor Co., 59 Franklin street, the official headquarters, and prepare for a rest after their first week's trip. It was gratifying to know that despite the road and weather conditions to contend with, only three of the actual starters had dropped out of the run, they being Elliot C. Lee, of Boston, who turned back before reaching Albany; Mrs. Susan D. Malpas, who reached Albany and then returned to New York, and George Otis Draper, of Boston, who, like the others named, had only entered for part of the run, and stopped after reaching Albany.

The Buffalo automobilists turned out in full force to greet the tourists at the headquarters, the Iroquois Hotel. Percy Pierce had completed the run of 73 miles in less than four hours, and was greeted by his many friends in his home town. He was closely followed by Mr. Hurlburt, Cadillac, and by A. J. Seaton, Buckmobile. Esselstyn, Franklin, and Huss, Oldsmobile, were delayed slightly, owing to the fact that they got off the road and went six miles out of their way.

The greater number of the tourists did not stop at Batavia, the noon control, but pushed right on to Buffalo. A large crowd was waiting in front of the Iroquois to greet the tourists, and cheered them as they came up. The usual crowd of camera fiends were on hand and snapped everything in sight. Most all the cars had been cleaned up before leaving Rochester, and the people who had gathered, expecting to see mud-covered machines and tired and dirty tourists, were disappointed. The roads had been very good, and were well dried out, and the occupants of the cars looked clean and happy. The afternoon was pretty well gone when the last of the machines reported.

The roads between Rochester and Buffalo delighted the hearts of the tourists, being fairly smooth and in excellent condition. The men with fast cars had been holding them in all week, on account of the bad roads, and they took advantage of the conditions to make up lost time, and stir the winds. Twenty miles an hour was described as a snail's pace, and the majority were tearing along over the forty-mile mark, Mr. Whipple's letter to the contrary notwithstanding. No. 31, Lillibridge's White steamer, driven by Sonnantine, made the eighty-mile run in three hours flat, a sure proof that all the speed ordinances met were fractured. Pope-Toledo 59 was delayed for a few minutes investigating the damage done to a frisky dog that happened to get under its wheels. The animal was hurt but not killed.

Webb Jay and "Pop" Lowe, both driving White steamers, broke rear springs bouncing over jolts on the way to Buffalo. They had weakened the springs in the earlier stages of the run. Two new springs out of the White supply trunk, which is shipped each night by rail to the end of the day's journey, were put in before the start on Monday.

Harlan W. Whipple, Mercedes, met with his first accident when about eighteen miles out of Buffalo. He was driving along at a fair rate of speed when suddenly the car stopped sparking, and the machine was brought to a standstill. It was found that "the time shaft" operating the valves had broken off at the pin fastening the gears to the shaft. Luckily, the gear did not drop into the flywheel, and no further damage was done. Mr. Whipple waited along the roadside until R. P. Scott came along in the 70 h. p. special Peerless. Mr. Scott had been talking about cars with Mr. Whipple previous to the start, and the latter had voiced the opinion that the seventy-horse product was not much account. Mr. Scott now had a chance to prove that this statement was erroneous, and he did so. A rope was hitched on to the Mercedes, and the big car was towed into Buffalo at a good clip. The joke was on Whipple, and he acknowledged it. The courtesy of the Pierce factory was extended to Mr. Whipple, and his car was towed there and a force of mechanics put to work on it. They took the broken gear shaft out and fixed up another, and in five hours' time had the car running again as good as ever. This was the only mishap of the day's run.

The Megargle boys did not leave Rochester until 3 o'clock in the afternoon, and were late in arriving at Buffalo, reporting about 10 o'clock. It was feared for a time that they were in trouble, and telegrams were sent along the route of the day's run in hopes of locating them, and sending out assistance should it be necessary. Hurlburt's Cadillac was delayed an hour by a puncture en route.

The Pierce car was taken to the factory and given a general overhauling. The front axle had been badly sprained, it was claimed, during the White Mountain climb. This was remedied also. Pierce had started from Rochester at about four o'clock in the morning and was in Buffalo before eight.

At Buffalo.

On Saturday night several members of the Buffalo A. C. called at the Iroquois Hotel and extended the courtesy of their clubhouse to the tourists, at the same time inviting all to attend an informal smoker to be held there. A number of the tourists availed themselves of this opportunity to attend, and enjoyed the entertainment provided for them.

A telegram was received at the Iroquois on Saturday evening from La Roche stating that he had reached Chicago at 9:40 A. M. on Saturday morning, establishing a new American record of 1,200 miles in 120 hours' consecutive running of the motor. He stated that the road conditions were deplorable. A message was also received from R. H. Johnston at Cleveland, Ohio, stating that a Peerless car would enter the run there.

In all the large cities passed through by the tourists the Mayors sent messages to the Mayor of St. Louis. The chief executive of Buffalo was not to be outdone by the others, and penned the following, which will be carried through to the Fair City and handed to Mayor Wells there:

"Dear Sir:—On behalf of the citizens of Buffalo I desire as Chief Executive to tender Buffalo's felicitations to the World's Fair Mayor, and have taken advantage of the opportunity offered by the St. Louis automobile tour to convey greetings to you personally and through you to the citizens of St. Louis.

"Buffalo has been greatly interested in the St. Louis tour conducted under the auspices of the American Automobile Association, and it is especially appropriate

that these greetings be sent to you by the participants in the St. Louis tour, inasmuch as Buffalo has more automobiles per capita than any other city in the world, even outranking Paris, France.

"I believe that St. Louis Day at the Fair is to be celebrated on August 11, 1904, the day following the arrival of the tour participants, and I desire to extend congratulations to you upon that occasion, with best wishes that the day may be a record-breaker in the history of the Exposition.

"Trusting that the automobilists will reach your city safely, and reiterating the wishes of our citizens for a glorious success for the Exposition, I remain,

"Very truly yours,

"ERASTUS C. KNIGHT,

"Mayor."

The National Battery Co. sent word to the official headquarters at the Iroquois hotel, that any of the tourists who desired to have their batteries charged could send them to their place, and the batteries would be put on charge free and returned in prime condition.

Strange to say, there were no calls on the hotel register for 3 A. M. on Saturday night, as there had been at the various hotels en route. The "tourists" were prepared to rest up and weren't going to tour on Sunday.

At eleven o'clock Sunday morning several members of the Buffalo A. C. called in their machines at the Iroquois, to pilot such of the tourists as desired to make the run to Niagara Falls and return, a distance of fifty miles. Dinner was to be served at the Falls. A number of the tourists took out their cars and made the trip, risking a possible tie-up. Those who did not want to run their own cars were accommodated with seats in the machines of the local clubmen.

There was little repair work done at the garage as far as the actual replacement of parts was concerned, but all the drivers overhauled, cleaned and oiled their machines thoroughly, and inspected them for loose nuts and bolts preparatory to the start on Monday for Erie, Pa.

Between Saturday and Monday the tourists had plenty of time and opportunity to discuss the merits of their respective machines, and each, of course, was willing to admit that the other cars in the run were all right, but believed in his own heart that his own particular car was the best of them all. James M. Waters, of New York, and his chauffeur were loud in their praises of the foreign-made cars. They stated that they had made the run from New York to Buffalo without making a single machinery adjustment, and without a stop en route for troubles of any sort. They did not start until Tuesday, and made the run from New York to Albany with but one stop, that being for lunch. Mr. Waters was of the opinion that the American cars of to-day are very good for from six to eight months' use, but after that time depreciate rapidly, and lose both their money value and their mechanical perfection. He mentioned that numerous imported cars were in use in the United States to-day that had been in service for four or five years, but did not know of a case where an American car had seen the same length of service and still had any great money value in the open market.

A special meeting of the members of the Touring Committee on the tour was held at the Iroquois Hotel on Sunday morning. Matters of general interest were talked over, and it was learned that enough entries had been received to cover all expenses. The matter of the racing indulged in by some of the manufacturers' cars entered was also discussed. There was some little comment over the fact that the Pope-Toledo was getting into all the big night stops first, scooping all the free newspaper advertising for itself. Of course, no one man came to the front to make an official protest, and the session was supposed to be a profound secret, but, nevertheless, it is known that this matter was discussed, and that steps were to be taken to prevent this, or at least take away the glamor of the newspaper puffs from this one car. The course to be pursued will no doubt develop later along the line. Getting into towns first seems to be the main object of the great number of the tourists, who are racing continually with this idea in view, staying up half the night in order to get an early start in the morning.

But few of the tourists took their cars out to Niagara Falls on Sunday, a number riding in the cars provided for their use by the Buffalo automobilists. Others took advantage of the day to rest up after their hard week's work. The run to the Falls was without incident. The two Pope-Toledos, Buckmobile, Mr. Water's Panhard and two the White steamers were among the tourists' machines that made the run. Judge Hotchkiss, of Buffalo, in his Packard car, led the run, accompanied by James L. Breese in his 40 h. p. Mercedes. The run to the Falls developed into a great race between big cars, and a fifty-mile-an-hour pace was set up on the river road coming back. Dinner was served at the International Hotel, the tourists paying for their own meals, the affair not being under the auspices of the Buffalo A. C., as had at first been reported. Mayor Alligher, of Tonawanda, led the cars in a powerful machine, and set the pace at nearly fifty miles an hour through his own village. He jokingly remarked later that his car was running so well that he just had to let it out, and would pay a fine if called upon to do so. James M. Waters, in his Panhard, had his speedometer up to forty-eight miles an hour, and was duly

ON THE ROAD BETWEEN ALBANY AND UTICA.

proud of that fact. It was highly evident that the racing craze was deeply imbedded in the bones of the tourists.

There was quite some activity at the garages on Sunday afternoon, all the cars being looked over thoroughly. The coil on the Elmore was taken out and repaired. A new rear spring was placed in Mr. Gillette's Pope-Hartford, to replace one that had broken on the trip through to Rochester. New rear springs were also put in Mr. Lowe's and Webb Jay's cars. In all the cars the working parts were gone over and cleaned up as much as possible, in one of the machines the batteries were renewed, and there was a general repairing of punctured spare inner tubes.

A COMPETITION CUP.

While in Buffalo C. J. Glidden, who is making a tour of the world in his Napier car, held a conference with President W. H. Hotchkiss, of the Buffalo A. C.; Augustus Post, President Whipple and several other leading members of the A. A. A., regarding the conditions to be set for the reliability test cup which he will offer in competition next year. The trophy, Mr. Glidden announced, will cost over $2,000 and stand over three feet high.

The Touring Committee of the A. A. A. will have charge of the competition. Mr. Glidden suggests that the distance of the run be not less than 1,000 miles, to be covered in ten days, each car to be driven by its owner, accompanied by a lady, if he has a family, and by an engineer and one observer. Two hundred pounds of baggage must also be carried. These details are not at all fixed or certain, and it is intended to settle the details and make an official announcement after the arrival of the tourists at St. Louis.

F. W. Richards, driving a Phelps car, who made the run from Boston to Buffalo, left the crowd at the Queen City, he having decided not to continue the run further. It was his original intention to go only as far as Albany, but he had been prevailed upon to continue to Buffalo.

On Saturday evening at the Iroquois Hotel Sheriff Keiser, of Buffalo, served papers on R. P. Scott, of Baltimore, Md., in a suit for heavy damages brought against him as the result of an accident on the streets of Rochester on Friday afternoon, when the big 70 h. p. Peerless car was coming through the town. A fractious horse belonging to Simon August, of Rochester, was trotting near the curb, and, taking fright at the auto, ran away. The horse in its mad dash fell and broke its leg, and had to be shot. The driver was also injured. The animal was a valuable pacer, said to be worth $2,000. The papers were hurried on to Buffalo so that they might be served while Mr. Scott was still in New York State. Mr. Scott said that the accident was entirely unavoidable, and he was not running at a high rate of speed at the time it occurred.

TALK AT THE IROQUOIS.

Mr. Birchwood, driving the small Haynes-Apperson car, was justly proud of the fact that his little machine had towed Mr. Whipple's big Mercedes for six miles before Mr. Scott happened along in his 70 h. p. Peerless on Saturday and took the disabled machine in charge. Albert L. Pope, riding in a 24 h. p. Pope-Toledo, stated that his car had been driven from New York without the cooling water being changed or any new water added, and he intended to complete the entire distance to St. Louis without replenishing the cooling supply. D. B. Huss was properly enthusiastic over his Oldsmobile tonneau. He had not experienced the slightest trouble since leaving New York, not having been compelled to even tighten a nut or bolt on his car or even pump up the tires, a record which he maintained compared favorably with that of any of the best and highest priced cars on the run. Mrs. Harlan W. Whipple intended to end the run at Buffalo, but was so enthusiastic that she decided to go on to Cleveland, and if she does not change her mind again, will return home from there by train.

THE WHITE STEAMERS AT SYRACUSE.

Buffalo to Erie.

Early Monday morning Jesse B. Eccleston, of Buffalo, started out in his Rambler car to scatter confetti and mark the roads to Erie, a run of about 100 miles. The roads out of Buffalo for the first twenty miles were rough and bumpy, but after that the run was an easy one. A delegation of automobilists from Fredonia and a number of members of the Buffalo A. C. were on hand in their cars to escort the tourists out of the city. Judge Hotchkiss decided to accompany them the entire distance to Erie.

On Sunday night it was announced at the headquarters that James L. Breese and his son, James L. Breese, Jr., in their 40 h. p. Mercedes, would join the run and continue to St. Louis. They were on hand Monday morning for the start. The car had a complete touring equipment, extra tires, etc., and attracted no little attention, the back wheels being fitted with tires on which were heavy leather straps studded with huge flat-headed nails, making the tire non-skidding and practically puncture proof. Mr. Breese stated that he had run the tires over 1,000 miles, and experienced no trouble to date. Another new starter from Buffalo was Mr. Hoag, who drives a Covert runabout. He will put the car through to the Fair City.

It was announced at the starting point that W. C. Temple, driving a Pierce Great Arrow, would start from Erie, Pa., Monday night and go through the tour. Ten or eleven starters are expected at Cleveland, including four Peerless cars, two more White steamers, a Stearns and a Winton car. The Pittsburg contingent will also join in at Cleveland. Among these will be W. C. Temple, President of the Pittsburg A. C. He wrote to the committee that he did not intend to race, and would allow Mr. Whipple to set the pace for him. Of course, under these conditions he will not have to travel over forty or fifty miles an hour. The White steamer people state that they intend to have ten of their cars in line before St. Louis is reached.

As early as 6:30 some of the tourists were ready to start, and they lost no time in starting. It was nearly 10 o'clock before the last car pulled out, and the crowd in front of the Iroquois dispersed. The following were the starters from Buffalo:

Harlan W. Whipple, Mercedes; C. H. Gillette, Pope-Hartford; Carl Page, White;

stus Post, White steamer; R. P. Scott, p. Special Peerless; Charles J. Glid- Napier; Frederick H. Lesh, Pope- lo; C. V. Birchwood, Haynes-Apper- Ray D. Lillibridge, White; Webb Jay, e; P. F. Megargle, Elmore; George owe, White; W. C. Hurlburt, Cadillac; Manross, Columbia; H. C. Esselstyn, klin; James M. Waters, Panhard; D. Iuss, Oldsmobile; Harold L. Pope, ford; Albert L. Pope, Pope-Toledo; Seaton, Buckmobile; A. D. McLaugh- Royal Tourist; Percy Pierce, Pierce Arrow; Royal M. Sheldon, De Diet- James L. Breese, Mercedes; Harold , Covert runabout.

AT ERIE.

(*Special Telegram.*)

yal R. Sheldon, scheduled to start from ilo, did not appear. Thomas Fetch, ig a 24 h. p. Packard, joined the run rie, Tuesday. The run to Erie was a ace, several dogs were hit, and twelve ens, two turkeys and two ducks killed ie drivers, and the road was a perfect oir. Charles J. Glidden was one of ite starters from Buffalo. When about miles out the city an irate farmer, enraged by the wholesale slaughter owls, came out in the road with a le-barreled shotgun and, pointing at Glidden's head, compelled him to stop car. The farmer then pointed to the chicken in the road and demanded a r for it. He kept Mr. Glidden cov- with the gun until the money was ed over, and then let him proceed. imerous entries from Chicago, Minne- s and other Western cities were re- d in Erie. Six cars are reported run- over the national highway, expecting in run at Cleveland to-morrow. All rs from Buffalo reached Erie, twenty- in all.

(*Special Telegram.*)

CLEVELAND, O., August 2.

venty h. p. Special Peerless towed into with broken steering knuckle. Twen- ur left Erie for Cleveland this morn-

A Personal Idea.

BY HARRY B. HAINES.

ter following the St. Louis tour by from New York to Buffalo, and get- to know the men on the big pleasure , one can scarcely help feeling that he run accomplish nothing more than ringing together of such a crowd of fellows, it would have acomplished gh to have more than repaid for the and trouble expended in its planning. art from the men and women who on the run, however, the whole trip t altogether the joyous event that the de public has been led to believe. The work, of course, falls on the chauf- and the men who take care of their cars, and in some cases these have been obliged to work half the night at the various garages in order to have their cars in shape to start in the morning. As far as possible, all the tinkering of machines is done out of sight of the people and newspaper men on the run. It was also intended to be kept secret that some of the manufacturers having cars entered were sending men ahead by train each day to the night stops and paying hundreds of dollars for the transportation of trunks loaded down with spare parts. In many cases this encouraged reckless driving, for the men knew that if they broke a spring or any such part jolting over bad roads, they could have it replaced with a new one at the night stop.

THE BUCKMOBILE AT THE TOLL GATE IN SYRACUSE.

It was really amusing at the night stops to see the men in the factory-entered cars swing up in front of the hotels, and then when the newspaper men crowded around, pretend that they did not want to be interviewed. They invariably gave all the information desired, however, and were sure to impress upon the scribe's mind the high importance of getting the name of their car right. The "first in" craze also seized the tourists the first night out, and various cars started as early as five o'clock in the morning, sometimes beating the confetti cars in at the night stop in order to get the advertising in the papers of the various towns for their fast run.

The whole affair is anything but a tour. There is nothing of the touring element about it. The various machines are ready for the start at six-thirty or seven o'clock every morning, and they then rush out on the country roads at twenty and thirty miles an hour, the occupants refusing to stop at the regularly appointed places for lunch, and rushing their machines through to the night stops, oft-times waiting as late as three and four o'clock for their noon meal. They have no opportunity to enjoy the scenery, and the run has all the earmarks of a professional contest, in which every entrant, be he a private owner or a factory expert, seems intent upon getting to the night stop in the shortest possible time and then getting all the free advertising possible out of it. A few of the smaller machines are taking things fairly easy, and stopping once in a while, but every minute is precious to the big fellows with the exception of the Peerless special, which is happy if it can waddle in every day any old time with its great seventy horse motor still intact.

Although this article may have the tone of a knock, it is not intended as such, for the objects of the tour are certainly most commendable and desirable, but the committee had to reckon without their host, and after six days out they find that instead of a tour on their hands, they have a healthy, full-grown road race every day.

If no accidents result, the trip will no doubt prove a great boom to automobiling and result in better roads through some of the States; but any one who imagines that the tourists are enjoying the grand scenery en route a great deal is very much mistaken. While not eating dirt while trying to overtake some car ahead of them, the big majority of the crowd are studying their watches and speedometers and wishing for better roads so that the speed ordinances might be more seriously fractured. No one says anything about speed limits. The policemen are interested in the tour, as are the constables, and the men in the big cars race merrily on undisturbed, killing dogs and chickens galore and disappearing in a cloud of dust and dirt toward St. Louis—touring.

COMMUNICATIONS

Some Experiences in Mountain Climbing.

Editor HORSELESS AGE:

It might interest your readers to report on some peculiar experiences. I joined the St. Louis tour party at Worcester on Monday, last week, having entered to drive as far as Albany with them, my business not allowing me time enough to go farther. The run from Worcester to Springfield was without incident, and I reached the latter city in the first four. Going from Springfield to Pittsfield, I got stalled on Becket Mountain, about 20 feet from the top, the grade being so steep that the gasoline in my tank would not run into the carburetor. There was no opportunity to back the machine onto a level where the gasoline would run in, and no time to try experiments, as I was blocking the way. Later, on another similar grade, I discovered that the difficulty could be easily overcome by blowing down the vent hole of the tank. Fortunately, there is a farmer with a span of horses who gets considerable revenue from hauling automobiles over this hill, and I suffered the humiliation of being assisted. Coming down on the other side, a severe jolt caused the cross steering rod to strike a stone or mound, bending it and the starting crank quite badly. This caused further delay. After lunch at Pittsfield, we struck muddy roads when over the New York line, and I skidded badly on one stretch, wrenching the rear wheel sufficiently to split five spokes and tear off the tire. Fortunately, there was a blacksmith shop one hundred yards away, and a temporary repair job was made, enabling us to reach Albany by 6 o'clock. I noticed a newspaper account the next morning said that I arrived late at night with a stripped sprocket —a rather misleading statement.

I turned regretfully homeward the next morning, and wishing to vary the trip, went up to Williamstown, intending to cross the mountain range at North Adams. I had heard this was a very tough proposition, and inquiry at North Adams disclosed the fact that shoes on the rear wheels were customary. I found no extra shoes in stock at the local foundry, and did not care to wait over a day to have any made, so started along. There is a very steep hill leading directly up out of the city which will test hill-climbing capacity to the utmost. I saw the mountain rise directly in front, but had no idea that I must climb over the top, thinking assuredly there was some gap. Examination of maps since arriving home shows that this hill is 1,400 feet above North Adams and 1,300 feet above the Hoosac Tunnel entrance on the other side. The climb up the hill was very tedious, and there were two very severe grades where the thick mud made it almost impossible for the wheels to get a purchase. It took a little pushing by friendly hands to help us over. After quite a run along the top of the mountain, we started on the downward path. My brakes had always served me well; in fact, we came down some pretty good hills on the trip to Albany, so I did not think it necessary to go to any extra trouble, such as setting them up. I could have assisted the brakes by running the engine on the low speed with the spark cut off, but did not think of it, as I had never found any such assistance necessary before. We ran down a short distance, and I found the machine absolutely unmanageable. Fortunately, there was a farm house yard where we turned in to check the momentum. It must be remembered that the car with the passengers and baggage weighed some 3,000 pounds. A light runabout would probably come down with much less difficulty. Seeing that it was practically impossible to go down without some sort of drag, we took an old telegraph pole of full size from the road side and tied it to the rear axle by a piece of half-inch wire cable found at the farm house. The grade from this point down was steeper than anything I have ever seen. I was told that men got out of their wagons and led their horses down, not being willing to risk staying in. As I afterward found, the descent was practically continuous for the entire distance, the road continually zig-zagging around rather sharp corners, with prominent hummocks for water sheds at short intervals. On one side the drop was sharp down to the valley. We went a few hundred feet, the machine gaining momentum all the time, in spite of both sets of brakes and the dragging pole. My man was standing on the rear step, ready to jump off in case of need. Suddenly the front end of the pole hit a rock, snapping the cable like a piece of string. The reaction threw the rear of the machine several feet in the air, my man falling over head first into the tonneau. At the next jolt he was thrown clear up out of the machine into the road, and did not see me again for some time. After this the machine was practically uncontrollable, for every jolt threw me up above the seat, temporarily releasing the brake. I had to steer with one hand, the other holding the brake lever, and we raced down at a speed which I should figure at least 30 miles an hour; and I have found by painful experience in court that my estimate of speed is inclined to be very moderate. I passed a farm house part way down, where an old lady stood wringing her hands, calling out to an unseen audience that I was certainly going to be killed. I was very much of the same opinion myself, as I did not think it possible that I could negotiate all the curves without being thrown out or running over the edge of the road. The bottom of the hill was finally reached, however, and the brake drums were so hot that the drops of oil squeezed out were boiling on the edge.

Stopping over night at Greenfield, I returned the next day through Gardner, Princeton and Clinton. I got out of my way near Mount Wachusett, and found another hill to descend, on which the grade was nearly equal to the former experience. This time I let the engine run without spark, but it was impossible to fully control the car even with this assistance. It is evident to me that if one is going mountain climbing he should have some extra attachments. The regular brakes have served all purposes for thousands of miles of ordinary running, but are evidently insufficient for work of this strenuous character.

I would be glad to hear from any one who has taken a heavy touring car down the North Adams Mountain without difficulty or would be ready to sympathize with any one having a similar experience to my own.

GEORGE OTIS DRAPER.

Spark Control and Safety.

Editor HORSELESS AGE:

Your remarks on spark regulation in connection with the Gordon Bennett winner are interesting, and I am much pleased to see that the makers and driver of the vehicle were willing to demonstrate the uselessness of such refinements as spark advancing. This will be considered stating it strongly, but it is a fact which cannot be denied that the thing wanted is instantaneous combustion beginning very closely to the dead center, instead of slow combustion, beginning a long distance ahead, for when the combustion is begun ahead of center, it increases the compression pressure and to this extent diminishes the power of the motor. Of course, if the combustion cannot be completed in time by any other method, it is necessary to make the spark early, but so long as the same ultimate result can be accomplished by other means, this method would seem to be an illogical one and one that should be abandoned.

The use of a mechanical generator, which must be turned at some speed before it will produce a spark, permits the spark to occur slightly ahead of center, for it insures that the flywheel has sufficient speed to carry over before the spark becomes of sufficient size to ignite, and the faster the speed of the magneto, the larger the spark (within reasonable limits), and consequently the more rapid the inflammation, with consequent lessened need for spark advancing. This avoids complication, needs no attention from the driver and meets all reasonable road requirements. It is well known that mechanical devices are improved by a simplification, and it therefore seems certain that needless devices will sooner or later be eliminated. A spark advancer has been made necessary by the extremely small diameter of the jump spark and will probably continue to be a necessity so long as the jump spark is used. The Bennett cup

r, however, used the make and break ı, and it is a matter of continual won- the writer that every maker does not, ith this system there is but a single c circuit, no high tension insulation, alf bushel of broken spark plugs d each vehicle, and little need for park advancing levers.

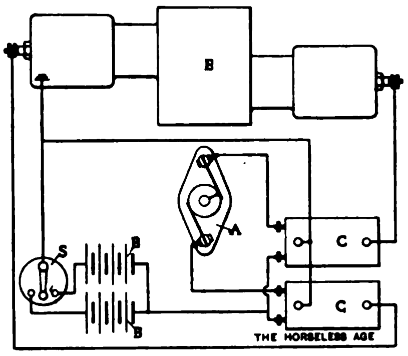
: number of auto accidents so fre- y reported is really appalling when hinks of the few vehicles in use as ıred with the horse-drawn variety. accidents are chargeable to two ⊢—recklessness, due to the exhilara- roduced by high speed, and inability, › lack of familiarity with the vehicle complicated and unhandy means of ıl. To overcome the second cause, the ıl should be easy and simple, and the ary elements of perfect and complete ıl should be in constant use, so that wanted quickly, they will be used ut thought on the part of the operator. act that vehicles meeting these condi- quite well are in use to-day indicates his feature may be had without trou- In my opinion, the greatest safety is to ınd in the use of a single brake, which, urse, must have ample power and , being used for all braking purposes, d most swiftly and with least mental on when the emergency demands. The argument applies to the speed con- A single lever constantly in hand l give all ordinary variations in speed, ıs slacking up for crossings and rough or opening up for hill climbing; and, :r, it should so fully and completely ɔl that by it both motor and vehicle be quickly and absolutely stopped. such a device always in hand, the act ıcking speed becomes second nature s done without thinking when occa- requires. If these two features could ɔrporated in every vehicle, the safety : auto would be very greatly enhanced, o long as these important features be secured by the use of several lev- ıe necessity for thought remains, with at possibility of error. I would be y pleased to see expressions from ı in your columns on this subject.

CHAS. E. DURYEA.

Queries.

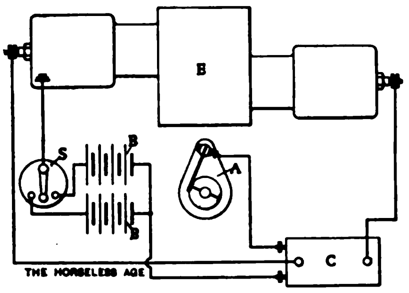
r HORSELESS AGE:

ave put a new motor in my carriage, ow find that the starting handle comes : way of the black spring hanger at the It is a Friedman wagon. If you ell me any way to get out of this, I be very much obliged to you. Could ıe starting be made like on an Olds- e or a Pierce? If so, please send sketch. Also, will you please give a ı how to wire a double opposed motor ıt I can use two coils and two sets of ies, or one coil and two sets of bat- . If you have any back numbers of LESS AGE that show these wiring please let me know. T. H.



WIRING DIAGRAM FOR TWO COILS AND TWO BATTERIES.

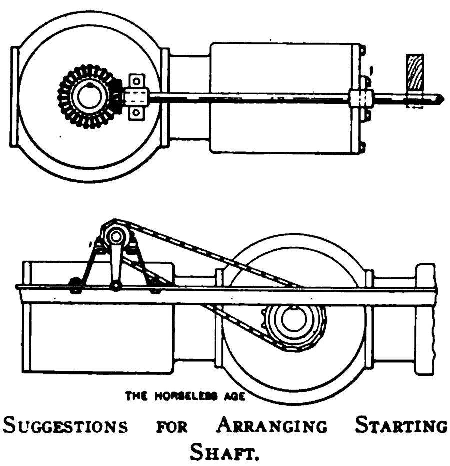
[If something is in the way so you cannot apply a starting crank to the end of the engine shaft, it is necessary to provide another shaft which is geared to the engine shaft. The chief problem is to provide bearings for this shaft, secured in such a manner that it will not get out of line with the engine shaft. We cannot well furnish you a sketch without seeing the car. If you can secure bearings to the sides of the crank case and the rear cylinder, you might arrange a shaft parallel with the rear cylinder and gear it to the crank shaft by bevel



WIRING DIAGRAM FOR TWO BATTERIES AND SINGLE COIL.

pinions. Here you must look out, of course, that the rear body sill does not interfere with the shaft, which should be either lower or higher. As the shaft need not be arranged horizontally, this end is easily secured. The rear end of the shaft should be cut with ratchet teeth, the same as are cut on the end of the crank-shaft.

If it is impossible to mount the bearings for such a shaft, a shaft should be arranged



SUGGESTIONS FOR ARRANGING STARTING SHAFT.

high in the seat parallel with the engine shaft, and geared to the latter by sprockets and a chain. The bearings for this shaft can probably be fastened to the engine frame sides. In either case it would be desirable to have a ball ratchet clutch in the gear (or sprocket) on the engine shaft, so that the starting shaft and gears remain stationary while the engine is running.

The ignition connections asked for are shown in the diagrams herewith, in which E represents the engine; B B the batteries; S a three-point switch; C C the coils, and A the contact breaker.—ED.]

Editor HORSELESS AGE:

Some drivers recommend suspended ignition when making a long descent. Is this not liable to result in a muffler explosion when the spark is again thrown in?

When laboring up a long hill, under late spark, what quality of mixture should be fed? A. E. FRASER.

[If the spark is shut off and then put on again while the engine is turning, explosions in muffler are very likely to result. A valve on the inlet pipe shutting off the carburetor and admitting only fresh air to the cylinder when coasting would be an advantage.

There should be no variation in the mixture with variations in the timing of the spark. The same mixture which gives the greatest power with an early spark is also best with late spark, at least within practical limits.—ED.]

Editor HORSELESS AGE:

Kindly give me the proportion of sulphuric acid and distilled water used for refilling small storage batteries for ignition purposes; also the charging rate of 15, 30 and 60 ampere cells. What should the acid test before and after charging be?

W. R. W.

[Use a 20 per cent. solution by weight of sulphuric acid; the difference in density before and after charging depends, of course, upon the proportion of electrolyte to active material; and the density should not exceed 1.25 after charge and not decrease below 1.12 at discharge. A battery should not be charged in less than three hours, and the maximum charging rate should therefore be about one-third its ampere-hour capacity. It is well to reduce the current when battery is nearly charged. —ED.]

Remedy for Popping in the Carburetor.

Editor HORSELESS AGE:

I have read the article on "Cause of Popping in the Carburetor" in your July 27th issue. I run and have the care of a 20 h. p. (double opposed cylinders) touring car of popular make, and have often experienced the popping in the carburetor, but find that it can be remedied by tightening the "breaker box," which will pre-

vent miss-firing. This box is very liable to work loose, and when in that condition the cylinders will invaribly miss and cause the popping. The carburetors are of the float-feed type.

S. W. Shimer.

Some New Kinds of Troubles.

Editor Horseless Age:

On a recent pleasant Sunday afternoon I started with four people for a 20-mile run, but it was cut in halves, because the engine commenced to act badly. It raced like a whirlwind when the clutch was out, and then there were hundreds of explosions in the muffler. I did some work on the machine in an endeavor to locate the trouble, but it was so warm I gave up the job, but managed to run the machine home, going by jerks. The following day it was found that a bit of leather packing had become fastened in a check valve operating the pneumatic governor, so it was held open all the time, and the result was a big supply of gasoline. To add to the bother, one of the spark plugs was out of order, as the core had turned around, so that the spark had to jump over the top, and it did not always do so, and many charges were therefore not exploded in that cylinder. It took an expert mechanic all day to locate the trouble.

A day or so later a friend who has a new car, of which he is mighty proud, invited me to take a 50-mile trip, but when the time arrived, the friend came in another man's car. I asked where the new machine was, and was told that the spark plugs kept getting smoked up, and the engine did not run well enough to warrant a long journey. The machine we started out in was shy one cylinder of the four, through some wire difficulty, and a front spring was broken, a wooden block supplying the place of the steel. The carriage made the run back and forth, but it had one hot box and the wooden block came out several times.

I reached home at 7 P. M. after the 50-mile run, and found my own gasoline car in front of the house, with the stable man waiting for me to go on a 10-mile trip after one of my electric machines, which was stalled with an exploded tire. It had been waiting two hours for relief. We took on extra tires and tubes and made a quick journey. It was hot at the place where the tire had to be put on, and the job did not seem any easier because I had not eaten any dinner. However, we got the tire on, and the electric made a quick job of getting back to the stable.

The following evening I started in the gasoline car for a ride by starlight, and after five miles there was an explosion in the rear, which meant a flat tire. Luckily I carried an extra cover, but it was tied on top of the canopy, and it was quite a job to get it down. In fact, it took longer to unhitch the tire and put back the old one than it did to remove the cover and put a new one on the wheel. Practice has made me pretty expert in repairing tires, but no matter how well the job goes along, no one can enjoy the work when the temperature is high.

I have had considerable trouble with tires this season, because I was trying to use last season's goods. After working on the road several times, I put on a new set of tires, and they were filled with air at 175 pounds pressure, because the tire man said they should be pumped hard. Well, they were hard all right, for the carriage rode as though it had solid tires. However, after a 25-mile run at good speed, I found that the tires were barely warm, while if they had been at the usual pressure, all would have been hot.

Many troubles come from inexperience. I have a friend who graduated from a little tea-kettle carriage by degrees to a four-cylinder car. The first trial he gave it resulted in stripping the gears, because in shifting the gears from low to high he speeded up the engine and then let go of the clutch. It cost a good bit to repair damages, and when the car was coming back from the shop, a $65 tire exploded with great violence. The first two days' run cost the owner so much that he did not have postage money left from a $100 bill—but his courage holds out.

Another man I know met with a mishap because a drunken rascal kept dodging in front of the machine. Eventually the man stood still a minute, right in the track of the car, and then jumped sideways just as the front of the carriage turned in the same direction. A collision seemed unavoidable, but by applying the emergency brake and the reverse the automobile was stopped in a short space, with disastrous results to the machine, for the differential gears were stripped, and one tire was cut off the wheel, as the road was filled with small stones. The episode cost $75 for a new tire and repairs.

Tires are, of course, a serious problem on a car weighing 2,000 pounds or more, for even the most careful treatment cannot prevent accidents to the pneumatic coverings. Punctures are not serious, but they are bothersome. However, the repairs are easily made. Explosions are what worry us, for they mean another cover and a long delay in getting the injured cover repaired. I recently sent two covers that had small holes in them to the makers, and after two weeks they came back with a tag attached saying they were not worth fixing. The tires had not run many miles, were not rim-cut, and they appeared to me to be good enough to warrant spending $4 or $5 on, and so I sent them to a man who repairs tires of all kinds. He fixed them up, and they have stood a lot of wear. Now I am kind of wondering if the same sort of talent that condemned the old tires is employed in manufacturing new ones. Anyhow, tires appear to be like lottery tickets.

Other folks have troubles here also. I have one friend who is a considerable crank on automobiles, and he recently bought a fine steam depot carriage, of which he talked a great deal to his wife, expatiating particularly upon the convenience of the new car when they wanted to go out to dinner in the evening, because it had a fine top and glass sides that could be closed to keep out rain, wind and dust. Well, the other evening the machine was steamed up, and, with friends, a start was made for a yacht club five miles away, where a dinner was to be served. The machine traveled finely about three minutes, when there was an explosion, and one of the rear tires went flat. Words are useless in such cases, for they would not fill the tire, but the owner of the carriage did say a few things. The party returned home, and the old gasoline touring car was dragged out and fitted for the trip. It went over the course all right.

I have another friend who gave up a big bunch of good money for one of the most expensive American cars, with a four-cylinder engine. He is the real thing on automobiles and keeps his machines on the go all the time. After running about 6,000 miles with the car, and while it was in good order so far as traveling was concerned, it was put into a shop to be fixed up a bit. When it came out the engine was "all off," and after a few days it went back to the shop, where the mechanics reported that the engine was all to the bad—in fact, they said the cylinders were useless. This fact was communicated to the makers, and they promptly agreed to send a new engine. That showed an excellent disposition, but while waiting for the new engine the carriage is idle, and that right in the busy season. Maybe the trouble came from causes that could not be prevented, or perhaps from carelessness, but whatever the reason the result is the same—the car is laid up.

Another experience I had lately happened on a fine Sunday, after my old 1902 car had been pegging away all day on bad roads, and eventually brought up in the country, where there were two new cars, the owners of which have occasionally referred in more or less slighting terms to what they have been pleased to call my "locomotive," because the engines make noise enough to be heard. In order to keep my end up, I have let drop a few remarks to the effect that the old-timer was generally ready for use, and that it seldom missed getting home. It happened that a gentleman calling at the house wanted to get back to the city quickly, and so the chauffeur was asked to get out one of the new machines and make the trip. The carriage started out bravely enough, but it soon came limping back, because something was out of order that could not be readily repaired on the road. Then the second machine was brought out, and it traveled all right. Incidentally, the gentleman who owned the disabled carriage found he must skirmish out into the com-

er provisions for the next day, and reckoned upon using his new motor gathering the provender. He did y anything upon the subject in my ꞡ, but somehow he slipped away, and I was chugging back home, with my ırchlight blazing brightly, I saw an ıite horse hitched to a rickety little edged in among the trees by the side road, about a mile from the farm. archlight brought out in bright relief ell-known countenance of my auto- friend, who seemed to be trying to imself from view. And we passed by rush of wind and a cloud of dust.

course, these incidents do not prove ng regarding automobiles, except, y, that all makes meet with trouble. s it would seem nicer to chronicle he pleasant side of the sport, but it ıs that few people take any interest id events, and we users of machines ı credit a machine with its non-stop but we always charge up all the s.

ROBIN DAMON.

essive Burning of Timer Contacts.

Horseless Age:

ave a four-cylinder, air-cooled car, ıodel, with special timer, dynamo and spark system. I am troubled with ntact points of timer burning away, gh I keep it packed with grease. In les the revolving contact point will ıbout one-half away, and then I can- t contact enough to run on high gear, on level road; by putting in a new the engine will run on high gear and p speed on quite an up-grade. I wrote manufacturers of the timer, who re- that they had never heard of such a efore, and advised me to keep it well d with grease, which I had done, so hat was not the cause of my trouble. a timer of this make that had been n a car like mine for 1,500 miles, and ntacts showed absolutely no traces of ıg, and the timer had never been with grease; the only lubrication it ot was a little cylinder oil put on oc- ally, and at the time of my seeing it, ı absolutely dry; but this timer was with batteries only. So I thought that running my dynamo governor pulley high a speed, but I run the dynamo ıs fast as will keep the engine at the speed as when being driven by bat- ; in other words, when engine is run- nd I throw the switch from batteries namo, and vice versa, there is no dif- e in the speed of the engine.

battery set is composed of six cells r batteries, 1.3 volts, 12-15 amps. By the cover off the timer and running n battery and then on dynamo, I can ı difference in the amount of sparking en the contact points, neither can I see ifference, whether the timer is dry or ated. There is a continual sparking under all the various conditions. Whether on the dynamo or batteries, I can see no difference in working of the four-cell spark coil; I get quite a little flame at the vibrators, but cannot seem to adjust them so as not to get this flame. Can you help me out of the trouble? I had the same trouble with the timer which originally came with the car, but hoped that the special one would cure it. I have a friend who got a car like mine last year, with dynamo, and he never has had to turn up the commutator of the timer, while I could not run over 10 miles with the original one on my car before it would be burned so that I could not run on high gear at all and could barely run on the low gear.

W. H. C.

[The rapid burning away of the timer contacts may be due to a too heavy current being generated by the dynamo, or to a broken-down condenser in one or more of the coils. When there is excessive sparking at the vibrator points, and it is impossible to correct this by any adjustment of the contact screw, the usual cause is that the condenser inside the coil is broken down. That the engine does not speed up when you change over from the battery to the dynamo is no sign that the dynamo does not generate an excessively strong current, as an excessively hot spark does not increase the speed of the engine. But if it is impossible to prevent sparking at the vibrator contacts, it is a fairly good sign that the coils are at fault. In reality a coil used with a dynamo should have a stronger condenser than a coil used with a battery.—Ed.]

Shyster Lawyers Molesting Automobilists in Massachusetts.

Editor Horseless Age:

Young lawyers are working up a graft in Massachusetts that is getting to be a nuisance. A motor car was seen to brush by a lady standing over the curbstone, ruffling her dress a little, when two men stepped up to her and advised her that she was very much hurt. Taking the number of the car, they proceed to threaten the owner with a suit for damages, advising him also that $25 would make them happy and avoid further trouble.

The writer had occasion to be passing a house that was being moved into the street when a Freshman was hit by a stick falling from some part of the building. A young sleuth on the sidewalk took my number, and I got a notice to either appear in court, be to a lot of trouble, or pay the usual $25.

Doctors are not backward in working the game also. A barefooted boy who fell in the street and barked his knee up, while chasing a ball, narrowly escaping being run over by a car, came around to the owner of the car and advised him that foreign lawyers would sue him if he did not do the right thing by the doctor.

It is high time owners of automobiles clubbed together and subscribed a general fund to fight such attempts at extortion. I hope your paper will suggest some remedy.

One of the Victims.

Law of the Road.

Editor Horseless Age:

In your issue of July 20 I notice that J. T. Fischer inquires for the rules of the road. I do not know that all States have laws on this subject or if they do have such laws I am not prepared to say that they conform to the laws of Massachusetts. In the Provinces and some parts of Europe I understand that people on foot or in teams when meeting each other turn to the *left*. This is the opposite of the law here. In Massachusetts the law is as follows:

Revised laws, chapter 54 (in part).

OF THE LAW OF THE ROAD.

Section 1. When persons meet on a bridge or way, traveling with carriages, wagons, carts, sleds, sleighs, bicycles or other vehicles, each shall seasonably drive his carriage or other vehicle to the *right* of the middle of the traveled part of such bridge or way, so that their respective carriages or other vehicles may pass without interference.

Section 2. The driver of a carriage or other vehicle passing a carriage or other vehicle traveling in the same direction shall drive to the left of the middle of the traveled part of a bridge or way; and if it is of sufficient width for the two vehicles to pass, the driver of the leading one shall not wilfully obstruct the other.

This is written law here and must be observed. It is very likely that in some States where the population is not of Eastern stock some other custom may be in use.

H. G. Barr.

[The rule of the road in regard to passing other vehicles is the same throughout the United States. You pass to the left to overtake a vehicle moving in the same direction as yourself, and to the right to pass a vehicle moving in the opposite direction. The same rule is observed in France, Germany and Italy, but in Canada, England and Austria the rule is to keep to the left side of the road.—Ed.]

Gasoline Runabout Proves Very Satisfactory.

Editor Horseless Age:

I am a subscriber to your valuable paper and have found many practical suggestions in the "Lessons of the Road." I am afraid, however, that if I had read them before I purchased my car I should have felt I was buying trouble. I want to take exception to a statement made by some of your correspondents, "that the man who says he never has trouble on the road is a liar." I have a seven-horse power runabout that was in constant use six months last year and three months this, and has never had a breakdown, or delay on the road, aside from

some little adjusting required occasionally. I am out of business and use it every day, largely over common country roads, "good, bad and indifferent," some days making eighty or ninety miles. When I purchased I knew nothing of gas engines or machinery, but the car is nearly "fool proof;" it is water cooled, without a pump, has an automatic spark regulator, and to me seems more simple than most of the machines. I do my own oiling and use lots of it. I always know that I have water and gasoline, and my car never fails me.

My great expense is tires. Last year, including the cost of one new single tube tire, they cost me $49.50. Aside from that my expense for the six months, including gasoline, grease, oil, etc., was $90. There is a general impression that an auto is an expensive luxury. I have not found them any more expense than a horse; in fact, much less, as my houseman cleans it, and I dispense with a barnman. My runabout is well known in this vicinity, and all I affirm can be substantiated.

SCHUYLER M. COE.

Registration Requirements.

Pownal, Vt., July 22.

Editor HORSELESS AGE:

As I live in a free State (no-license) and wish to go into New York and Massachusetts from time to time, and do not wish to be held up for ransom, I appeal to you for advice as to licenses. I have written to the New York and Massachusetts Secretaries of State for license blanks, and they very kindly sent me the laws in regard to auto licenses; but their laws are like Scripture—one passage conflicts with another—and as near as I can make out I must get arrested and test it out in court before I shall know what the laws mean. The Commissioner, A. B. Fletcher, 20 Pemberton Square, Boston, Mass., advises me to take out a $4 license if I wish to be free from police annoyance. What do you think of that one?

I believe licensing is all right if it will improve the highway and if it does not require too many petty sucker officers to pay, so there is no money left for the roads after they get in their little work and big grab. And if automobilists must pay license fees, use bells and horns, and carry lights, the horse drivers should be under the same obligations, especially as to licenses and lights.

AUTO CRANK.

[Both States, New York and Massachusetts, recognize the licenses issued by other States. We would advise you to get a New York license and a number plate bearing both the number and the initials "N. Y.," and this will enable you to run in both States without being molested by the police, provided you comply with the other requirements of the laws. The New York license fee is $2. If you registered in Massachusetts you would have to pay $2 for the registration of your car and $2 more for a personal license.—ED.]

Newport Race Meet.

The race meet of the Newport Amusement Association which was held last Saturday on Sachurst Beach, Newport, R. I., under the management of Reginald C. Vanderbilt, furnished entertainment for the large number of fashionable people attending. Because of the narrowness of the beach and the shortness of the available stretch the number of possible starters was reduced and high speed made impossible. The results follow:

First race, motor cycles—First, Oscar Hedstrom, Indian. Time, 1:27.

Second race, local gasoline cars of between 10 and 24 horse-power. First, Harry Hamlin, Panhard-Levassor. Time, 1:35¼.

Third race, local gasoline cars not exceeding 10 horse-power, to be raced in road condition. First, Otto Nestmann, Stevens-Duryea. Time, 1:35½.

Fourth race, local gasoline cars not exceeding 10 horse-power to be raced in road condition—First, Pembroke Jones, Renault. Time, 2:00.

Fifth race, local electrics—First, H. Bull, Jr., Waverley. Time, 3:32⅘.

Sixth racing, open to all, gasoline cars not exceeding 24 horse-power. First, H. E. Rogers, Peerless. Time, 1:29.

Seventh race, same conditions as previous event—First, Harry Hamlin, Panhard-Levassor. Time, 1:37.

Eighth race, open to all, gasoline cars not exceeding 24 horse-power. First, Edward R. Thomas, Mercedes. Time, 1:02¾.

Ninth race, local gasoline cars, not exceeding 10 horse-power, to be raced in road condition. First, Otto Nestmann, Stevens-Duryea. Time, 1:56 3-5.

Tenth race, open to all, gasoline cars not exceeding 24 horse-power. First, H. E. Rogers, Peerless. Time, 1:27.

Buffalo Race Meet.

The Automobile Racing Association of Buffalo will hold a two days' race meet at Kenilworth track Aug. 12-13. The programme provides for twelve races of five miles each for the various makes of cars owned in Buffalo; a ten-mile race for cars of from 881 lbs. to 1,432 lbs. in weight, any motive power; a five-mile race for cars of from 551 lbs. to 881 lbs. in weight, any motive power; a fifteen-mile "free-for-all" for cars of from 1,432 lbs. to 2,204 lbs. in weight; and the Buffalo handicap, open to all owners of cars in Erie and Niagara counties. Besides the Diamond cup, donated by the Diamond Rubber Co. Prizes of from $25 to $100 in value will be contested for. Entries close Monday, Aug. 8, with D. H. Lewis, 110 Broadway, Buffalo, N. Y.

Trade Literature Received.

Hayden Eames, American Trust Bldg., Cleveland, O.—"A Few Words in Regard to the Expense of Operating Electric Business Vehicles."

The Garvin Machine Co., Spring and Varick streets, New York City.—List of second-hand machine tools.

Miller Mfg. Co., Peekskill N. Y.—Circular of Duplex motor lamps (acetylene).

F. B. Stearns Co., Cleveland, O.—"The Incomparable Stearns in California."

A. E. Gallien, 12 W. 33d street, New York.—Catalogue of the Samson leather tire.

Van Husan & Farr Co., Detroit, Mich.—Circular of the Snell hydraulic gasoline drawing system.

Charles A. Vuille, Huntingdon, Pa.—"Something About Gasoline You Should Know."

The Hartford Rubber Works Co., Hartford, Conn.—Folder on the Perfected Dunlop Detachable Automobile Tire, with model of same.

G. & J. Tire Co., Indianapolis, Ind.—Route Schedules of the St. Louis Tour, with information as to garages and repair facilities at all stops.

New Incorporations.

Peoria Automobile Co., Peoria, Ill. Capital $5,000. S. K. Hatfield, Charles L. Gage, E. N. Giles, incorporators.

Macnish Automobile Co., St. Louis, Mo. Capital $10,000 Incorporators: Fred J. Macnish, James Macnish, Ralph B. Macnish and I. M. Macnish.

Automobile Racing Association, Buffalo, N. Y. Directors: A. H. Knoll, W. C. Jones, J. A. Crammer, C. W. Roe, J. B. Eccleston, F. J. Wagner.

Patents.

765,670. Double-Tube Pneumatic Tire. Arthur H. Marks, Akron, Ohio. July 26, 1904. Filed March 3, 1904.

765,835. Spring-Tire. Ludwig Herz, Feucht, near Nuremberg, Germany. July 26, 1904. Filed February 24, 1903.

765,841. Speedometer. Joseph W. Jones, New York, N. Y. July 26, 1904. Filed March 28, 1903.

765,880. Means for Feeding the Induction Ports or Fuel Inlets of Internal Combustion Engines. Franklin L. Chamberlin, Cleveland, Ohio. July 26, 1904. Filed May 27, 1903.

765,955. Running-Gear. William H. Birdsall, Utica, N. Y. July 26, 1904. Filed March 2, 1903.

764,639. Vehicle-Tire. George H. Sherman, Detroit, Mich. July 12, 1904. Filed May 13, 1903.

764,644. Variable Speed Transmission Gearing. Henry L. F. Trebert, Rochester, N. Y. July 12, 1904. Filed Sept. 2, 1902.

MAINTENANCE AND REPAIRS

The Tire Repair Outfit.

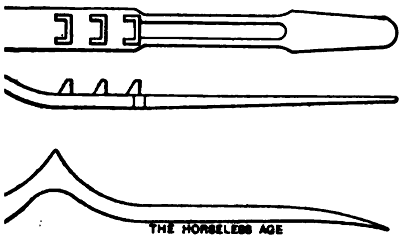
ubstantial tire repair outfit is a neces- part of the equipment of any car. It great waste of time and effort to at- to repair a damaged automobile tire ut the aid of good sized levers and patches, and the experienced operator refore quite willing to give to tire im- nts a good proportion of the available in his tool box.

re are many appliances which may be ed in a repair set as "luxuries," which ell to carry if they do not occupy that might be employed to better ad- ge; but there are a few which are ssities," and for these space must be led.

re should be at least two, and prefer- three, metal levers of not less than t in length, an inch in width and a r inch thick, slightly tapering at one They may be of any of a number of on shapes, but experience has shown hose illustrated in Figs. 1 and 2 meet ements in a very satisfactory manner. ever shown in Fig. 1 is useful in hold- p the outer edge of the shoe while lve stem or a retaining bolt is being place, as shown in Fig. 3. No. 2 is l in forcing the last section of the over the edge of the rim in the man- own in Fig. 4. Both of these styles l be included in the outfit.

ch could be said on the subject of it. It is a substance which varies in quality, but none but the best is enough for tire repair work. It is s to spend time with inferior grades, difference in price is not nearly pro- nal to the difference in adhesive quali- It is well to have on hand at least a int of heavy black cement in an air- tin can. The small tubes put up for icycle trade do not hold a sufficient ity, and the cement employed is far ght for this heavier class of work.

assortment of prepared rubber patches ious sizes can be obtained from near- tire makers. They are specially treat- the underside, so that they will stick and are usually circular in shape with d edges, so that they are not easily off. It is well to carry also a good piece of rubber from a discarded inner tube, from which patches of irregular shape can be cut if necessary.



FIGS. 1 AND 2.

For patching holes in the outer shoe, two or three pieces, about a foot square each, of prepared canvas, such as the tire manufacturers can supply, should also be included. It is light and can be folded to occupy very little space, so that it will cause no inconvenience, while an abundance of repair material may prove extremely handy in case of an accident to a cover in an out-of-the-way place.

A sheet or two of sandpaper is necessary for use in cleaning and roughing up the surface of the rubber before the cement is applied.

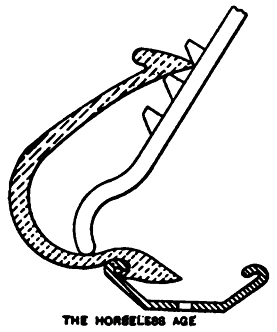


FIG. 3.

Talc or French chalk should be rubbed over the inner tube before it is inserted in the shoe, as it acts as a lubricant, and prevents to a considerable degree the heating of the tire caused by the frictional action between the outer shoe and the air chamber. A wooden box of tubular shape about one inch in diameter by six or seven inches long, having a screw top, will hold a sufficient amount of powder for several applications.

If the outer layer of rubber on the tire shoe is cut through, it is necessary to prevent dirt and water from working into this cut; and in extreme cases, when the fabric is also cut, it is necessary to give to the tire at this point an external support, to prevent the bursting through of the inner tube. The leather or rawhide sleeve shown in Fig. 5 accomplishes both these objects admirably. As is clearly shown in the sketch, it is so constructed that it conforms to the shape of the tire, and can be fastened tightly about it by means of the hooks and lacing shown. It is, of course, possible to obtain the same results for a time by the use of a strap which may be wound about the tire, but the leather sleeve is more substantial, and when properly applied will permit of running on a badly damaged tire for many miles.

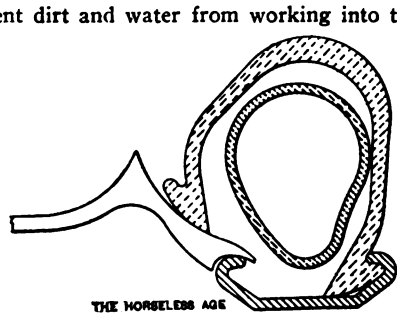


FIG. 4.

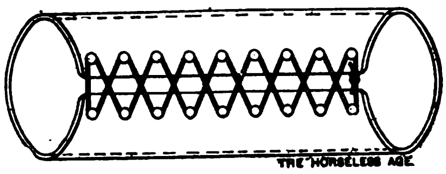


FIG. 5.

It is well, also, to include in the kit extra washers and caps for the valves, and one or two extra retaining bolts. A round rod about six inches long, of such diameter that it will pass freely through the bolt holes in the rim, will be found handy in pushing these bolts free from the rim when a tire is to be detached. These sundries do not take up any great amount of space, and may be found to be well worth the room they occupy.

Whenever a repair is made, the tire requires to be pumped up again and a tire pump must therefore constantly be carried. A strong, well-made pump, even if it costs a little more than would seem to the uninitiated to be a reasonable price for such an implement, will soon pay for itself in the satisfaction it gives. In inflating an automobile tire to its proper pressure the pump is subjected to tremendous strains to withstand which it must be strongly made. It should be filled with not less than two feet of the heaviest and best of rubber tubing to the end of which should be attached a coupling of generous proportions.

A Blow at Extortionate Toll Charges.

The automobilists of Montgomery County, Pa., feel that they have won a decisive victory over the Springhouse and Sumneytown Turnpike Co., and believe they have done much to put an end to extortionate charges for toll on motor cars on the turnpikes throughout the State. Although a recent attempt of C. W. Wainwright, of Norristown, to secure a ruling on the legality of such charges was unsuccessful, the prospect of being compelled to defend actions brought by some forty other automobilists has led the company to announce that in future the charges for motor cars will be the same as those for horse-drawn vehicles and that in all probability automobile owners would be reimbursed for the excessive amounts which they have paid.

A somewhat unusual spectacle was witnessed in Ludgate Circus, London, recently. After a shower the pavement was very slippery, and a pair of horses drawing a heavily-laden truck were unable to move same. Just then a powerful motor truck arrived on the scene, and noticing the predicament of the horseman, the motor driver fastened a long chain between his truck and the horse vehicle, and the latter was towed up Fleet street, horses and all.

MINOR MENTION

The Springfield (Ill.) Automobile Club has been organized.

An automobile coach line is contemplated to connect Rochester with Fairport and Penfield, N. Y.

The H. H. Franklin Mfg. Co., of Syracuse, are soon to erect a large addition to their factory.

The garage of J. C. Nichols, of Cohoes, N. Y., was damaged by fire to the extent of about $1,500 last week.

The motorcyclists of Hartford, Conn., met last week and took steps toward the formation of a motorcycle club.

Five persons were seriously injured recently by the overturning of a car descending Benedict's Hill, Tarrytown, N. Y.

Peter Harris, of Manchester, N. H., took part in a recent run of the Granite State Automobile Club in a steam car of his own manufacture.

The automobilists of Sterling, Ill., propose to organize a society for the purpose of securing better roads and better care of the streets of the city.

A party of land-seekers report that they were recently shown over the Rosebud Reservation in Bonesteil, S. D., by an Indian chief in an automobile.

The Packard Motor Car Co. of Detroit are charged by the police with carrying bogus numbers on the cars which are driven about town by their employees.

Through the collision of his car with a dog, George F. Schultz, of Buffalo, and Mrs. A. L. Pearse, of Sanborn, N. Y., were seriously injured recently.

A new garage which is building between Warren and Hurd street, Lowell, Mass., has been leased to Norton & Fuller, a firm of automobile dealers of that city.

Will C. W. M., whose communication on "A Kerosene Launch Engine" appeared in our issue of July 13, kindly send us his address? His letter has been mislaid.

A building is being erected near the office of the B. F. Goodrich Co., of Akron, Ohio, for the housing of the automobiles owned by the officers of the company.

Leo C. Jacoby, of the Auto Supply Co. of New York, and a maker of automobile guides, committed suicide in a private sanitarium on July 25. He had been ill for some time.

The Contest Committee of the A. C. A. has just issued a very complete and well illustrated report of the service test of motor wagons which was conducted by it from April 4 to 9 last.

The death of Mrs. Charles Hurst, of Brooklyn, N. Y., is reported from Altamont, Ill. She with her husband were en route to St. Louis in their automobile when it was struck by a train.

The Swinehart Clincher Tire & Rubber Co., of Akron, Ohio, inform us that they have opened branch offices at 315 Eighth street, Oakland, Cal., and 514 North Broad street, Philadelphia, Pa.

The recent attempt of Jerome Ellis and A. G. Schmidt to break the road record from Chicago to New York for automobiles ended in failure. They were stopped by heavy rains at Olean, N. Y.

The police of Rye, N. Y., believe that a band of burglars which has of late been pillaging the homes of the wealthy residents of that town made use of an automobile in carrying on their operations.

The Building Inspector of Baltimore will endeavor to secure more stringent regulations in regard to the storage of gasoline. The Automobile Club of Baltimore will be given a hearing on the subject.

The Bliss-Chester Co. of Providence, R. I., inform us that they have recently fitted a number of auxiliary tubular radiators to cars equipped with cellular coolers, which proved too small in hot weather.

Arthur Nutt and Amelia Davis, two young students, were killed on July 29 in a collision between the automobile in which they were riding and an electric car, which occurred not far from Sidney, Ohio.

By the use of an automobile, C. P. Cole, president of the Lancaster (Ohio) Bank, was able to prevent the closing of the bank's doors in the face of a run. He carried $55,000 in gold from Columbus to Lancaster in record time.

Dr. Brandow, of Pittsfield, Mass., is reported to have constructed a generator for acetylene lamps in which the flow of gas is self-regulating, and the gas stored when the valve is closed so that it is ready to light at any time.

The members of the Automobile Club of Southern California are aroused by the charges of reckless driving made against its officers by the editor of a local automobile magazine. They maintain that the charges are without foundation.

An automobile race meet is to be held at Poughkeepsie, N. Y., on September 16 under the auspices of the Dutchess County Agricultural Society. The program provides for five events, and prizes from $25 to $100 in value are offered.

A number of automobile enthusiasts met at Long Branch on July 27 and formulated plans for the holding of a carnival week August 15 to 20. The program includes races, floral parades, starting and stopping contests and an indoor exhibition.

Secretary Bassett, of the L. A. W. has proposed co-operation between Long Island automobilists and bicycle riders to end the useless stopping of automobiles and bicycles by ambitious deputy sheriffs who have of late seriously inconvenienced many law-abiding citizens in this manner.

The Joseph Dixon Crucible Co. recommend to paint carriage springs with their silica-graphite paint or with a mixture of linseed oil and flake graphite, claiming that if they are given this treatment they will never squeal, ride much smoother, and probably never break, as they will not rust.

The action of Martin Rudy, in chopping down a toll gate to force a test case against a turnpike company, has not met with the approval of the Lancaster Automobile Club, of which he is a member. The club has cautioned its members against careless driving, and has urged them to comply with the law in all particulars.

On the afternoon of July 20 the Boston police, acting under instructions from the State Highway Commissioner, stopped cars in all parts of the city for the purpose of ascertaining by an examination whether the owner had complied with all the requirements of the law. It is understood that very few cases of non-compliance were found.

The Chicago Automobile Club will take action in the matter of J. B. Burdett and E. L. Dunn, who were recently fined $100 by Justice of the Peace Hill, of Lombard, Ill., for exceeding the legal rate of speed. They maintain that they were complying with the law in all particulars, and that the constable who made the arrest was guilty of conduct unbecoming an officer through the use of abusive language.

The Executive Commissioners' Association at the St. Louis Fair has passed a resolution requesting President Francis to place pilots on "each and every automobile maintained and operated within the Exposition grounds, with distinct orders to cut the tire and place powdered emery on all delicate working portions of the mechanism whenever such vehicles are operated at a speed in excess of one mile per hour while within the confines of the Louisiana Purchase Exposition."

Legislative and Legal.

The authorities of West Brookfield, Mass., have posted notices about the village to the effect that the speed of automobiles is therein limited to six miles per hour.

An ordinance requiring the licensing of automobiles with the city clerk and the display of numbers 4 inches high, and limiting speed to 8 miles an hour, was passed last week by the Rockford, Ill., Council.

It is reported that the Selectmen of Stockbridge, Mass., have decided to offer a reward of $50 for the arrest and conviction of all persons violating the speed limit law, which provides a maximum speed of five miles per hour in the business sections.

William C. Carroll has been appointed temporary receiver for the Lackawanna Motor Co., of Buffalo. Arguments for and against dissolution will be heard by John T. Ryan, as referee. It was stated in court that the company has debts to the amount of $10,000, and nominal assets of $15,000.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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The Road Race to St. Louis.

Before the alleged tour to the World's Fair city was half completed, all restraint and road decency had been thrown to the winds by a large number of the participants, and the event had degenerated into the most colossal farce as an automobile tour that has ever been recorded in the history of the movement. The officers of the run, instead of making efforts to subdue the racing spirit, as would have been their duty, took the lead in the law-breaking scorch and scramble for newspaper notoriety. There are very strong indications that some of the men in charge of the affair are under obligations to act as sandwich men to individual firms, and when the spirit of commercial rivalry became dominant they forgot all about their obligations as officers of the association under whose auspices the tour is conducted. According to authentic reports, the president of the association not only has made several of the stages at an average speed higher than the legal limit for the open country in that particular State, but has on several occasions made the fastest run of the day, and thereby stamped his letter to the participants before the start of the run, urging them to loyally join with him in exercising moderation and give the public an object lesson of the automobilists' respect for speed laws, as utter hypocrisy.

Can any one imagine a private gentleman and automobilist on a tour having for its objects only his own pleasure and the good of the automobile movement, starting each morning before daybreak, tearing over the roads at unlawful speeds, and never stopping for meals until the night stopping place is reached and an interview has been "granted" to a reporter of some local daily? Has any one ever heard of a private automobilist touring the country with his car labeled with signs setting forth some of his former achievements in automobiling? These feats were indulged in, however, by some of the supposedly private entrants in the tour, the former by the chairman of the A. A. A. Touring Committee and the latter by the chairman of the New England division. We submit that either the private character of these gentlemen is open to doubt, or their sanity. Contrary to the common run of law-breakers, those who broke the speed laws in this tour carried with them representatives of leading metropolitan papers, in order that the news of their misdeeds might be reported far and wide.

After this outrageous conduct of its officers, particularly its president and the chairman of its touring committee, we do not see how the American Automobile Association can possibly save its standing as the representative body of automobilists and the champion of just automobile legislation, except by demanding the prompt resignation of all those of its officers who are guilty of flagrant violation of the speed laws during the tour. The president of the association, for instance, is evidently an unfit person to represent the automobile movement in any case involving the legal rights of automobilists, having given proof of his utter disregard for speed laws; and the chairman of the Touring Committee seems to be unable to distinguish between a race and a tour, and to be absolutely unfit for the office he holds.

We venture to predict that unless the American Automobile Association takes some radical action to express its disapproval of the conduct of its officers in the tour, and speedily adopts a different course, its career as the representative automobile organization in this country will be short lived.

That the run would not pass off without serious accidents was to be foreshadowed as soon as it became known that the racing fever had broken out among the participants. Up to the time of writing, five upsets have been reported, and one car has been wrecked in collision with a train. High speed was, of course, the chief factor in most of these accidents, and it is a wonder that no more serious personal injury resulted. It need hardly be insisted upon that these accidents will not work to the good of the movement.

That Non-Stop Run Sanction.

We drew attention last week to the mistake made by the A. A. A. in allowing one of the entrants in the St. Louis tour to start with the rest and run over the course without stopping at the controls. This "non-stop" run has been represented as held under the sanction and supervision of the A. A. A., which is somewhat misleading. Application for sanction was made to the Racing Board of the A. A. A., but the sanction was refused. The two men who accompanied the car in the capacity of official observers were both vitally interested in the success of the run, and it would have been ridiculous for the A. A. A. to give them its official sanction. One of them represents the make of tires fitted to the car and is in constant business relations with the owners, while the other is an advertising solicitor for an automobile paper, and certainly did not make the trip for his health, but figured on advertising patronage, which, of course, was dependent upon the success of the venture. These observers were selected by the owners of the car. The reader can readily form his own opinion as to the value of a record made under such conditions.

The St. Louis Tour and Good Roads.

There has been a good deal of chaff on the effect the "tour" to St. Louis would have on the good roads movement, but we have never heard it explained in just what manner this effect was to be brought about. In our opinion, if the tour has any effect on the movement at all, it will be a negative one. That the roads in New York State and along the southern shore of Lake Erie are generally in poor condition was well known before the tour started, and did not need any further demonstration. On the other hand, what sort of demonstration of this fact has the tour furnished? In spite of the poor road conditions, the tourists, and particularly those who were most vociferous in their condemnation of the state of the roads, succeeded practically every day in breaking the speed laws on them, thus giving ground to the contention of those opposing the good roads movement that the Government is not justified in "wasting the people's money on improved roads for idlers to tear around on at unlawful and dangerous speeds." The conclusion seems obvious that if the present roads are so good that the automobilists in driving over them cannot refrain from indulging in unlawful speeds, further improvement would only still more encourage law-breaking and render the roads more dangerous to those users who respect the laws. Consequently, as far as its effect on the good roads movement is concerned, it would have been better had the St. Louis tour never been held.

The Course of an Important Case.

Events in connection with the now celebrated Cornell-Wicks-Foley-A. C. A. automobile shooting case have moved rapidly during the past week, with the result that the matter has taken on an entirely different complexion. The sheriff called upon Wicks, his deputy, to resign, but later, under pressure of politicians, declined to accept his resignation. The Automobile Club of America, acting through its Board of Governors, has adopted a resolution declaring Magistrate Cornell, the municipal judge who, it is reported, advised the shooting of automobile "scorchers," "unfit to preside on the bench, he having, by his utterances from the bench, incited citizens of this State to rioting and to the taking of human life." "That such utterances have borne fruit," the resolution continues, "is evidenced by the fact that an innocent man driving an automobile, who was declared by the court to be not guilty of violating the law, was shot at by a deputy sheriff." The club also instructed their counsel to institute impeachment proceedings against the magistrate in the appellate division of the Supreme Court.

In answer to the resolution, the magistrate has come forth with a lengthy statement in which he says that he has "never advised anybody to shoot anybody else;" that his remarks, while undoubtedly indiscreet, were made in an undertone and intended only for the ears of a policeman near at hand; that his words were not those credited to him in the press; that he can prove that Wicks had not heard of them at the time he did the shooting, and that he is sorry he did not explain before.

The Automobile Club of America, since this statement was made, has decided not to proceed against the magistrate, and as the last scene of the act Wicks, the ex-deputy, has been arraigned before Justice J. R. Vunk, of Patchogue, L. I., charged with felonious assault, and is held in $500 bonds to await the action of the Grand Jury in September. The automobilists in the case have thus been vindicated, the magistrate has gotten rather easily out of the unpleasant position into which he put himself by his indiscretion, and the boy deputy sheriff alone will suffer for his rash act.

British Imports and Exports.

The trade returns for June show that the imports of foreign-made motor cars into the United Kingdom are steadily increasing. In order to obtain the correct figures it is necessary to make allowance for those machines which were exported, having been brought into the country temporarily for that purpose. During June the net totals were 550 cars, valued at $1,161,125; car "parts," $223,355; 117 motor cycles, valued at $15,490; and cycle "parts" to the value of $6,970; amounting in all to $1,406,900. The figures for the first six months of the present year are 2,761 cars and 652 cycles, valued together with parts at $5,985,870. The exports of motor cars have been steadily falling off since February.

Calendar of Automobile Dates and Events.

Aug. 12—St. Louis Automobile Parade.
Aug. 12 and 13—Kenilworth Track Race Meet, Buffalo, N. Y.
Aug. 15 and 20—Automobile Carnival at Long Branch, N. J.
Aug. 17 and 18—Hamlin Track Race Meet Minneapolis, Minn.
Aug. 19 and 20—Glenville Track Races, Cleveland, O.
Aug. 21—Race Meet at St. Louis.
Aug. 26 and 27—Grosse Point Track Race Meet, Detroit, Mich.
Sept. 16—Race Meet, Poughkeepsie, N. Y.
Oct. 8—Vanderbilt Cup Race.

With an air velocity of twenty miles per hour, 38 sq. in. of radiation in an automobile tubular type radiator are necessary to cool one square inch of heated surface of the motor cylinder, with the pump delivering water to the radiator at a rate approximately of two gallons per minute, and with the temperature of the air as it would be on an average summer's day.

A Garage Turn-Table.

We have recently been requested by a subscriber to publish plans and specifications for a garage turn-table, and have made an effort to work out a design that we believe will suit his requirements and at the same time prove interesting to some others of our readers.

The turn-table, which is shown in the two drawings herewith, is intended for the ground floor of a garage which has no basement at the point at which the table is to be located. It is supported on short piles sunk in the ground, one located below its central point and eight located at equal intervals beneath its outer edge, the latter carrying a circular track upon which the table rolls.

The table called for is twelve feet in diameter, and as it will, therefore, be large enough to accommodate the largest cars made, its construction must be such that it will be able to withstand their weight and will turn easily, even though the weight is not distributed exactly evenly about the centre.

By supporting the table at its edge and using the central point merely as a guide and auxiliary support, both of these features are secured. The construction of the table itself is shown in Fig. 2, which gives a plan view from beneath. Six radial arms formed from 4x5-inch pine joists are joined and held together by the circular wrought iron plate C, which is bolted to them and has formed on it a cylindrical spur P, which holds the table central, and partialy supports the weight. The six radial arms are further secured in position by 2x2 and 2x4-inch cross-braces in the manner clearly shown in the sketch. To the outer end of each of these six arms is attached a standard truck wheel or castor, such as is obtainable from any large mill supply or hardware dealer. The size to be used in this case measures 4½ inches over all.

For a flooring, two layers of one-inch board are used, which are so laid that the length of the boards in the upper layer runs at right angles with that in the under layer, which runs at right angles with one of the radial arms. A binding of iron stock one-eighth thick by two inches wide is screwed to the outside edge and holds the two layers together. Fig. 1 shows a sectional view through the table and the ground under it, and illustrates the manner in which the table is supported. A pile, A, approximately 10 inches in diameter, is sunk into the ground to the depth of two feet in the center of the space which is covered by the table. Eight piles, B, of smaller diameter (approximately 6 inches) are set at equal distances about the circumference of a circle whose center is the center of the pile A and whose radius is 6 feet. Upon these rests a track made from standard 3-inch I beam, bent to shape and secured to them with railroad spikes. While the bending of these I beams is not an easy matter, it can be done by any good blacksmith. It will be necessary to make two or three joints in this track, and so far as possible these should be made where they will rest upon piles. The method of making these joints is shown in Fig. 1 and is practically that employed to connect railway rails. The abutting ends are bolted between two plates which fit between the flanges of the beam. If a joint must be made between two supporting piles, these plates should not be less than 16 inches long, and 4 bolts (2 in each rail) should be used. The plates in such a case must fit tightly between the flanges of the beam, in order to prevent a deflection at the joint as the load passes over it.

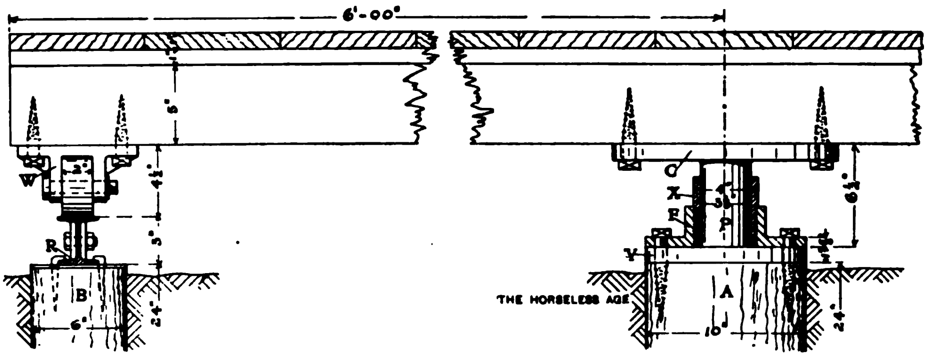


FIG. 1.—DETAIL OF TURNTABLE.

The detail construction of the central pivoting member is also shown in Fig. 1. The plate which has formed on it the cylindrical spur, P, is 12 inches in diameter and 1 inch thick. The spur is 3 1-16 inches in diameter, to fit inside a length of standard 4-inch wrought iron pipe, X, which screws into a standard pipe flange. This flange rests upon an iron plate 1 inch thick, which is secured between it and the top of the pile by coach bolts, which pass through both into the pile. The outside diameter of a standard 4-inch pipe flange is 9 inches, and the bolt circle is 7 inches in diameter. As the rail used measures 3 inches high, and the castor 4½ inches over all, it will be seen that the spur P should be 5½ inches long in order that the top of the central pile may be cut off level with those which carry the track.

If the turn-table is to be used on the second floor of a building, or over a basement, which, from our point of view, is the same thing, it can be done by hanging the track from beneath the floor and supporting the central member by truss rods.

The various details of this construction could, of course, be worked out in many ways. It is possible to use the construction shown without cutting through the floor, by simply using the floor as the tops of the piles are used. In this case the circular track should be constructed of flat iron about ½ inch thick by 3 inches wide. The top of the table will then be about 1 foot above the floor, and two diametrically opposite, hinged, inclined approaches should be fitted, so that the car can be run on or off at any desired point.

Among the appropriations recently made by the A. C. F. are a number to small communities for the purpose of tarring the roads through these places. The sums granted vary from $60 to $100.

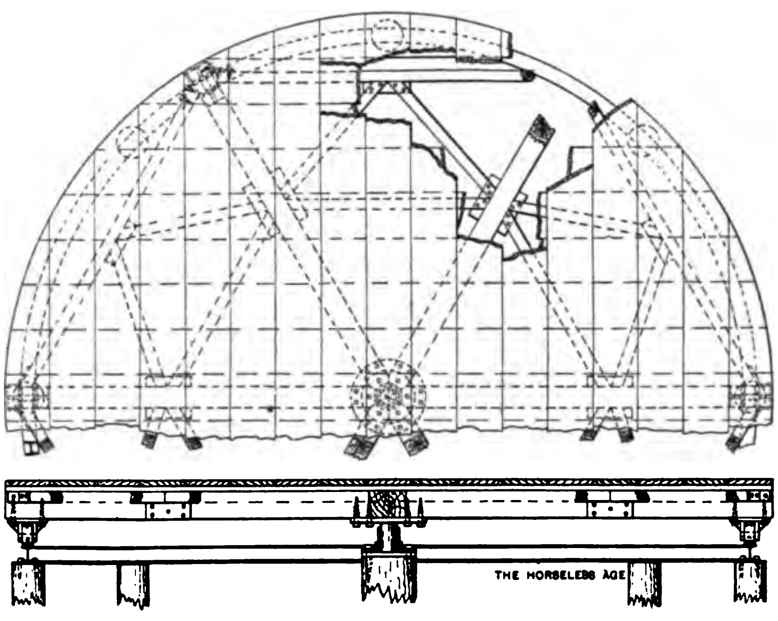


FIG. 2.—TURNTABLE COMPLETE.

New Vehicles and Parts

The Sturtevant Touring Car.

By Albert L. Clough.

The gasoline touring car which has been built by the Sturtevant Mill Company, Harrison Square, Boston, Mass., embodies in almost every department of its design such radical departures from stereotyped automobile practice as to warrant rather a detailed description.

In designing this car, a very original solution has been effected of the problem of control of the motive power. Simplicity in this regard, and the reduction of the number of levers and pedals necessary for the management of a car, has always been one of the most important desiderata, and in the Sturtevant machine there are actually but three controlling devices in addition to the steering mechanism.

The other important lines of development along which this machine has been worked out is the placing of all derangeable parts in positions of such accessibility that no ordinary accident of the road shall necessitate the operator's reaching under the machine for any purpose. Further than this, all delicate parts of the mechanism which occasionally require inspection and adjustment, and which may be deranged by exposure to the weather, are placed in the dash, which is recessed for this purpose, and provided with a plate glass door, through which the mechanism is constantly open to the eye of the operator.

The frame of the car consists of pressed steel sides, of proportioned vertical section, carrying spring hangers, and cross-braced by means of steel angles.

RUNNING GEAR.

The aim in view in the construction of this frame has been to secure in it the utmost degree of rigidity against distortion in the portion upon which are located the engine and change-speed gears, and to allow a reasonable degree of frame flexibility at other portions, in the interests of easy riding and long life of the running gear.

The cross framing is therefore disposed with this idea in mind, and the massive frame of the engine and the gear case are utilized in the interest of rigidity and permanent alignment of the motive power.

Semi-elliptic springs, 42 inches in length, are employed throughout, equipped with auxiliary spiral spring bumpers, which prevent them from striking together at the risk of breakage.

The wheels are of 34-inch diameter, shod with 4½-inch detachable tires. Ball-bearings, employing extremely large steel balls, are used in front and in the tubular rear axle. The wheel base is 108 inches, the tread standard, and steering is effected by means of a Brown-Lipe gear.

The body is finely finished and luxuriously upholstered, and is of the side entrance tonneau type, with baggage platform and rear door for the handling of baggage or parcels carried in the tonneau. There being no mechanism located further to the rear than the back of the front seat, the tonneau floor need never be disturbed for inspection purposes.

A square bonnet is made use of, the rear portion of which consists of the closet in which the electrical, indicating and other delicate mechanism is located. A part of the upper portion of this closet is occupied by the lubricating oil tank. The forward portion of the bonnet consists of the Whitlock cellular radiator, behind which is a belt-driven propeller fan. Twelve gallons of gasoline are contained in the tank, which occupies the upper portion of the bonnet.

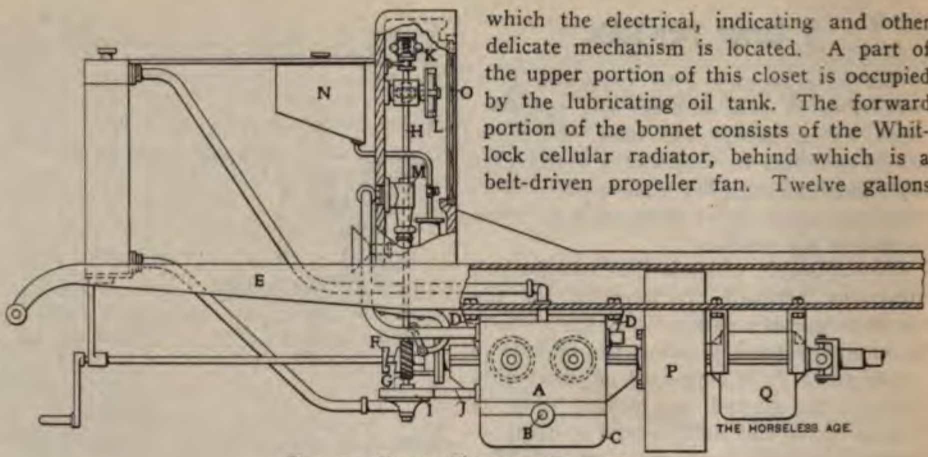


Fig. 2.—Front Part of Chassis.

THE MOTOR.

The motive power is furnished by a four-cylinder, horizontal engine, A (Fig. 2), located under the floor-board, and consisting of two pairs of opposed cylinders of 5-inch bore and 4-inch stroke, and capable of delivering 30 h. p. at 1,500 r. p. m.

The length of the engine is placed transversely of the car, thus bringing the crank-shaft parallel with the length of the vehicle. Each opposed pair of cylinders delivers its power to a common crank-pin through phosphor-bronze connecting rods. The crank-shaft thus has two throws. It is of liberal size, being of 2 inches diameter at the bearings and 2¼ inches at the pins, with a bearing length of 4½ inches at the former and 3 inches at the latter points. A spiral gear of very liberal dimensions is cut directly upon the crank-shaft, and gives motion to a longitudinal half-speed shaft, B.

Instead of bolting the cylinders to the common crank case in the conventional manner, the engine is held together by means of four massive steel tension members, or through bolts, two above and two below, which engage in slotted lugs in the end flanges of each cylinder casting, and draw the cylinders firmly against the crank case. They add greatly to the structural rigidity of the engine, and at the same time allow of easy dissembling of the motor.

All valves are mechanically actuated, and the two valves of each cylinder are located directly over one another, the inlet valves being on the upper, and the exhaust valves on the lower side of the head.

Each inlet valve, with its seat, is removable by the loosening of a ground flange secured by a bayonet joint, and the corresponding exhaust valve may be withdrawn through the same aperture after freeing the spring. Inlet valves are of 2-inch diameter, with flat seats, and the exhaust valves have 45° seats.

All valve-actuating mechanism is located beneath the cylinders, and is contained in an oil-retaining under-cover, C, which may be readily removed. Hardened steel cams

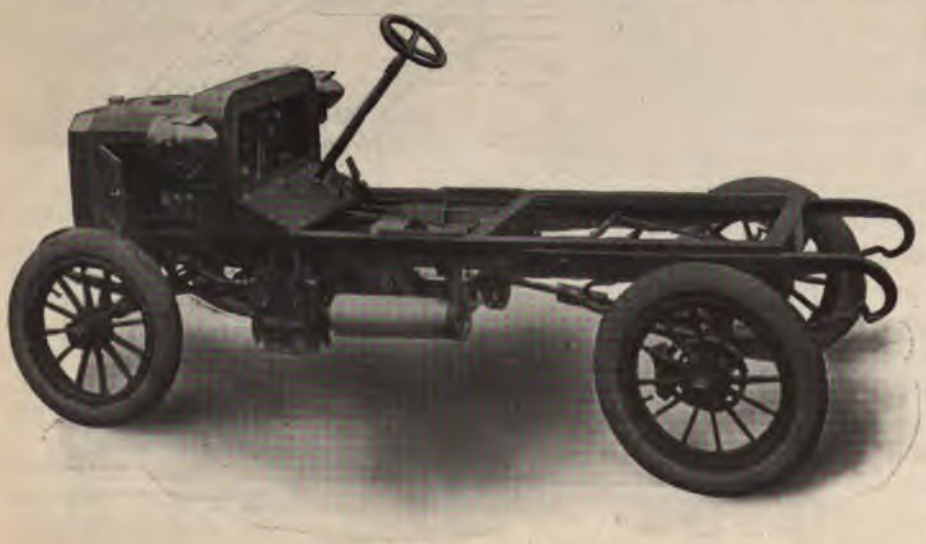


Fig. 1.—The Chassis.

with large roller followers are employed, which dip into and run in the oil bath thus constituted.

An especially novel feature of the motor is due to its method of support. The cylinder castings carry four lugs, D D, by means of which the engine is securely bolted to the pressed steel frame, E. These lugs are so located, and the length of the engine is such, that the valve chambers project outside the frame, thus bringing the valves in such a position that they may be lifted out without even disturbing the footboard.

This accessibility also extends to the spark plugs. The allowance of a liberal total length in the engine permits of connecting-rods long enough to minimize their maximum obliquity of action, and by the "underhung" method of support a low center of gravity is attained; while at the same time road clearance has not been unduly sacrificed, the lowest point being 12 inches from the ground.

In this construction ignition or valve difficulties may be adjusted without disturbing the passengers.

A crank-case cover gives access to the connecting-rods, which are of somewhat novel construction. There being two rods on each pin, and these two rods being in the same straight line, each rod tip encircles somewhat less than one-half the arc of the pin. An adjustable steel strap, which passes through a hole in the web of each rod, positively secures the rod tips to the crank-pin.

Oil is carried in the crank-case, and the main bearing brasses have oil boxes containing wicks designed to secure capillary feed. The cylinders and crank-pins are supplied by a force-feed lubricator.

The engine crank-shaft, on its forward extension, carries, in addition to the starting ratchet, F, a spiral gear, G, which meshes with a spiral pinion on a vertical shaft, H, which extends up through the closet in the dash, to which reference has previously been made. This is a double-speed shaft, and to its lower extremity is directly connected the centrifugal circulating pump, I, which is constructed with separate compartments delivering water to the jackets of the two pairs of cylinders respectively. This pump is mounted on the engine structure, and the bracket, J, which supports it is hollow, and thus serves as the supply pipe as well.

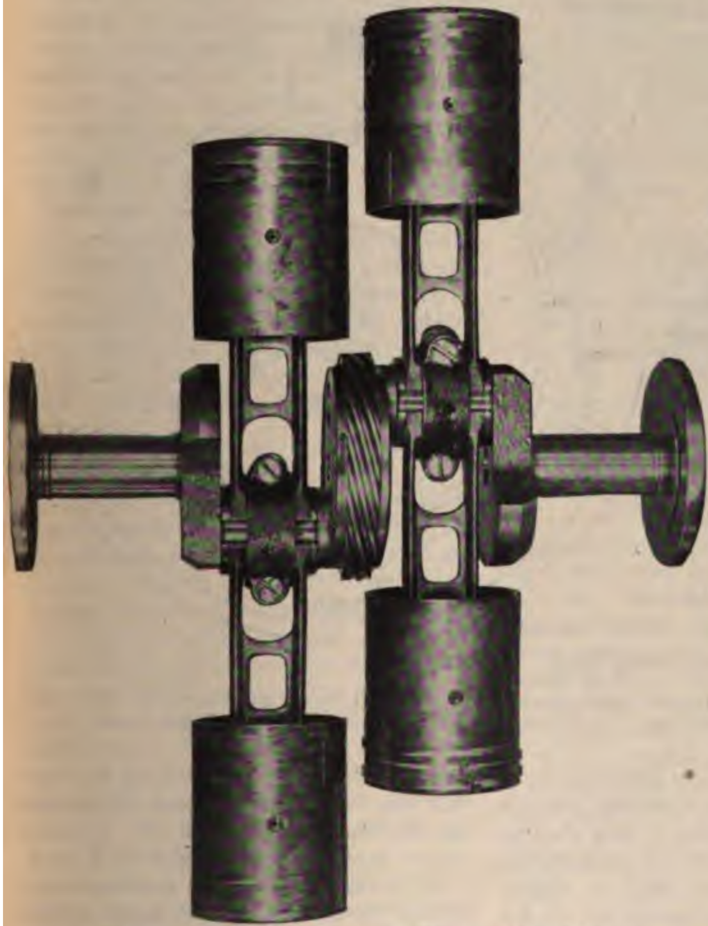


Fig. 3.—Crank, Pistons and Connecting Rods.

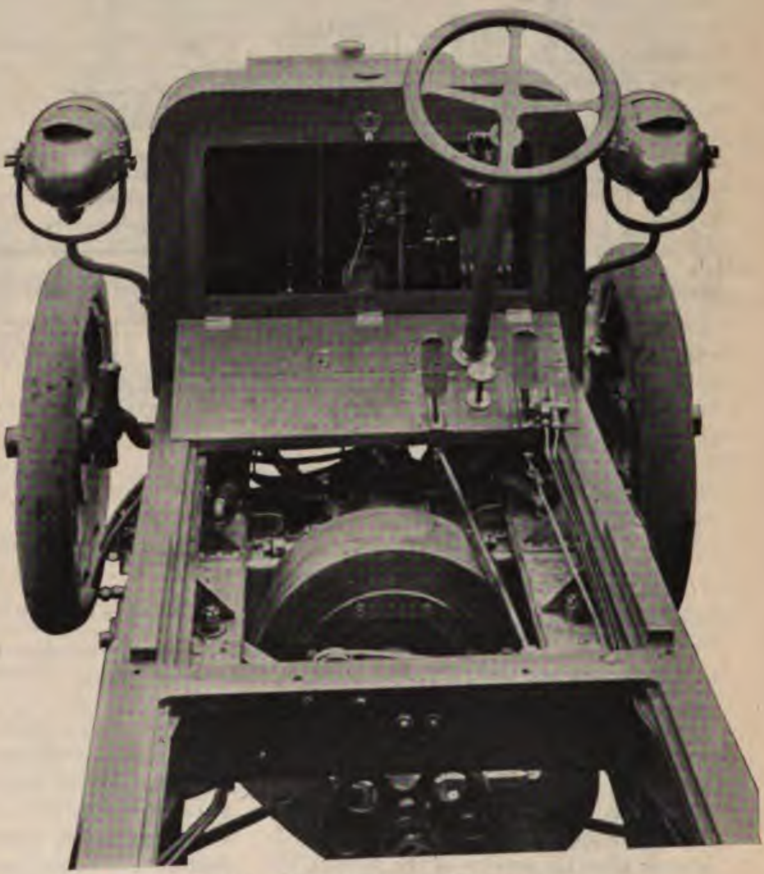


Fig. 4.—Rear View of Chassis.

FINE MECHANISM IN DASH.

A centrifugal ball governor, K, is carried upon the upward termination of the vertical shaft, H, and controls the action of platinum contacts, which, when the motor exceeds a speed of about 220 r. p. m., short-circuits the coil and vibrator, and thus causes the engine to miss, until the speed is sufficiently reduced. The combined contact device and timer, L, of the jump-spark system is connected to this shaft, H, and also the positive mechanical lubricator, which consists of oil rams—one for each tube—immersed in the oil reservoir, and driven on the pumping stroke by springs which are compressed successively by a ratchet motion.

In this hollow dash is also located the carburetor, M, which is supplied by gravity from the tank, N, in the bonnet. It is fitted with an automatic air valve to maintain a constant degree of vacuum, and the throttle and gasoline inlets are interlocked in order to secure, as the speed of the motor varies, a change of mixture that shall be correct at all times. The single vibrator coil is also in view in the dash.

The throttle and spark-timer are interconnected and operated by means of a foot button, which is spring-returned to the position of minimum gas supply and spark advance. The governor is cut out of action by the first touch upon the button.

Glass gauges, indicating the height of liquid in the gasoline and water tanks, and in the carburetor float chamber, are also located in this closet. The operator can, by looking through the plate glass door, O, observe at all times the feed of the lubricator, the action of the governor, coil-vibrator and spark-timer, and observe the state of

the water and gasoline supplies, and the action of the liquid in the carburetor chamber.

Upon the rearward extension of the crank-shaft is carried the hollow fly-wheel, P, which contains the automatically operated centrifugal friction clutches which form the most interesting feature of the car.

THE CHANGE-SPEED SYSTEM.

The principle of the centrifugal clutch is as follows: If a driving shaft be arranged to carry with it in its rotation a set of weights, which are drawn toward the shaft by springs, and if means are provided of communicating any outward motion of the weights due to the speed to a clutching mechanism capable of making fast the driving shaft to an adjacent driven shaft, then, so long as the driving shaft is rotated at a speed insufficient to cause an adequate outward motion of the weights, the driven shaft will not be set in motion; but, when a speed is reached by the driver at which the centrifugal force of the weights is greater than the tension of the springs, the weights and their attached clutching mechanism are moved, and the driving and driven shafts are clutched together with a greater or less degree of positiveness, dependent upon how much or how little the centrifugal force exceeds the pull of the springs.

Within the hollow and oil-tight fly-wheel of the Sturtevant machine are two of these centrifugal clutches—the high-speed and the low-speed. When the former is in engagement, the drive is direct. When the latter is in action, the drive is through a train of gears arranged like a lathe's back gears, which secures the desired speed reduction. The weights and springs of these two clutches are so proportioned, relatively, that the low-gear clutch is thrown into engagement at a much lower speed of rotation than is the high-speed.

Since both these clutches drive a common transmission shaft, and may be in action at the same time, some arrangement must be provided to allow of both clutches being set without damage to the gears. A silent roller ratchet is therefore introduced into the hub of one of the gears in the speed-reduction train, and this allows its shaft to overrun and to turn within it at a greater speed than it would be turned by means of the gear itself. The modus operandi of the arrangement is as follows:

When the engine pedal is in its position of rest, the motor is under control of the governor, and runs about 220 r. p. m., at which speed insufficient centrifugal force is developed in the weights of both clutches to cause engagement, and the car is at rest. If, however, the engine pedal be slightly depressed, the motor will speed up, and but a small increase of engine speed is required to cause a slight movement of the low-speed clutch weights, and a gentle engagement of the low-speed, when the car gradually moves forward.

A further depression of the engine pedal causes an increased, and finally a positive, engagement of the low clutch.

As the pedal is still further depressed, and if road resistance permits it, the engine will accelerate to a point adequate to generate sufficient centrifugal force in the weights of the high-speed clutch to cause their movement against their stiffer springs, when the high-speed will begin to take hold, and, if the pedal be sufficiently depressed, and the grade not too severe, this clutch will positively engage, and the drive to the rear axle will be direct.

When this condition is reached, the roller ratchet in the low-speed gear will cease to drive, and the pinion in which it is carried will run loosely upon its shaft.

Suppose now that the pedal is held fully depressed, and a severe grade is reached with the machine running on the high gear. As the grade begins to make itself felt, the engine will naturally slow down, and, as it does so, a speed will be reached insufficient to develop centrifugal force in the high clutch adequate to keep it in engagement.

When this point is reached, the high gear will slip, and finally cease to transmit, when the low-speed clutch, which all the time has been in positive engagement, will take up the work and furnish the increased torque which the road demands.

If by any possibility the road resistance should increase beyond the power of the engine on the low gear, the motor cannot stall, as the low clutch would automatically disengage before it was slowed down to its governed speed.

The Sturtevant machine in its regular commercial form will comprise two or three clutches and two or three forward speeds, but they will be automatically changed in exactly the manner described, in accordance with road resistance and throttle opening.

One of the difficult features of ordinary automobile driving is the exercise of judgment in changing gears, and it is only after long experience that one is able to change

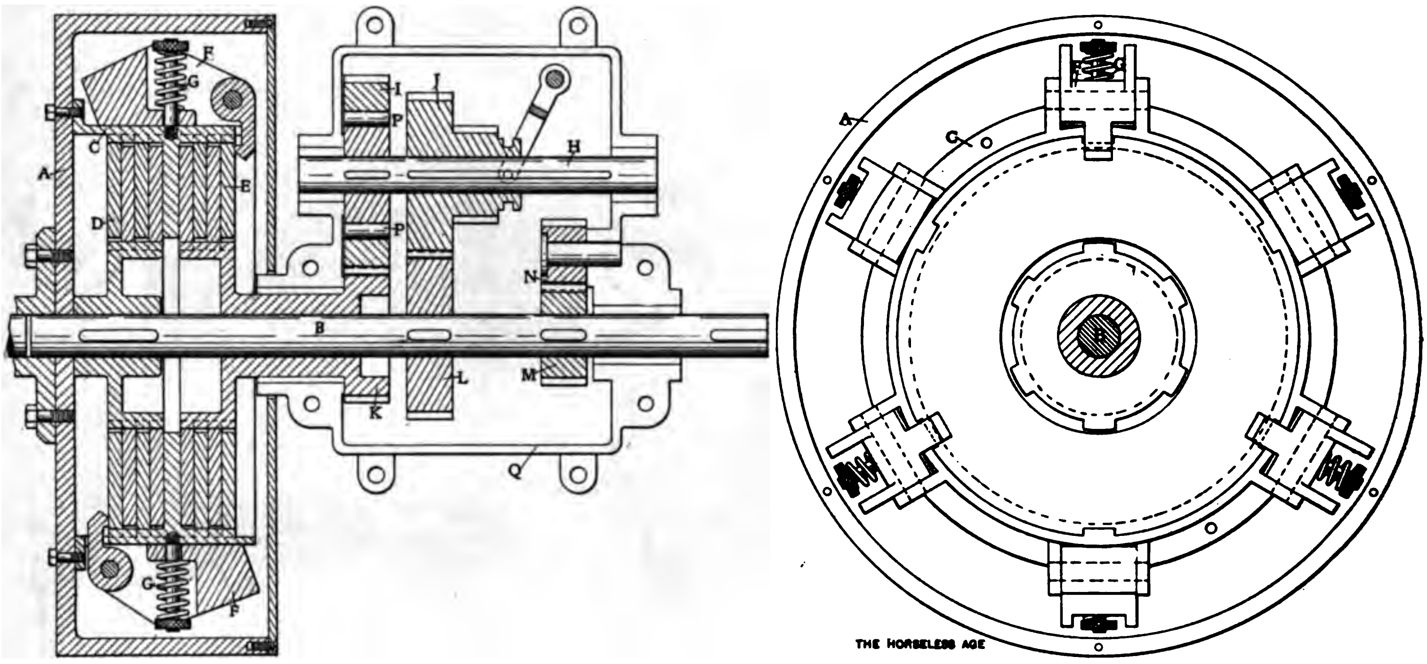


FIG. 5.—THE CHANGE SPEED GEAR.

A, fly-wheel or driving member; B, driven shaft; C, clutch drum; D, high-speed clutch; E, low-speed clutch; FF, clutch operating weights; GG, clutch springs; H, back gear shaft; I J, back gears; K, slow-speed pinion; L, slow-speed gear; M N, reversing pinions; P, roller ratchet; Q, gear case.

too early nor too late to secure icient results. With the centrifugal , this responsibility is taken from ılders of the driver, and the speeds llibly changed successively, in a per- ıutomatic manner, and in such a to insure the best results.

: is driving on the high, and a pro- ly increasing grade is met with, the liate will be automatically engaged proper moment, and, if it becomes y, the low will later be called upon. ly, when the top of the hill is and an easier stretch encountered, chine will pass through the inter- to the high speed as soon as the of the engine permits, and without n of the operator. By releasing the pedal the car is in a condition to eely, the engine running on the gov- t about 220 revolutions, and discon- from the clutches.

the clutches are of the multiple e, presenting a very large frictional and as they operate in an oil bath the enclosed fly-wheel, their wear prove very slight. Furthermore, trifugal weights revolving with the add their steadying power to the mo- allow of a reduction in the weight balance wheel proper.

ears are carried in a case just back ly-wheel, and are of wide face and pitch, with bronze bushed shaft . They run in an oil bath, and are le through a large hand hole.

PNEUMATIC BRAKES.

nore novel feature of the Sturtevant e braking system. A small tank is on the rear of the chassis, which nicates with one of the engine cylin- ough a cylinder check valve. A gas : is thus automatically maintained ank, which is piped to a three-way ıder control of a pedal. From the he pressure is piped to an air-brake located at each rear wheel-hub. n in each cylinder, having a long acts to tighten a double-acting strap n appropriate brake-drum. The alve being in the cylinder, the com- space is not increased, and the cyl- ompression unaffected.

motion of the brake pistons is so hat the brakes may be applied very if the pedal is but momentarily de- or they may be set with enormous f the full gas pressure be admitted. g stroke renders adjustment of the ardly ever necessary, and precludes sibility of their dragging on the The tires may also be inflated e brake reservoir.

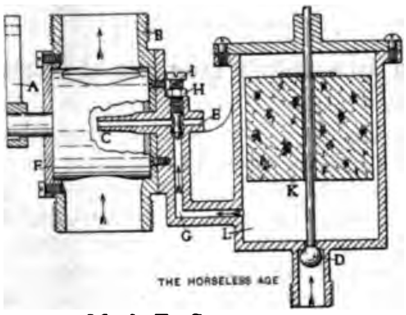
ıer extremely powerful double-act- ergency brake is fitted to act upon ısmission shaft, and is set mechani- a continued motion of the air- edal, so that in case there is no : in the tank, the car will still be promptly brought to rest. The reverse is operated by a pedal.

In driving the car, the operator places his left foot upon the engine button, and his right upon the brake pedal, leaving his hands at all times free for steering purposes. There is no opportunity for mishandling the car, and even if the brake is applied with the engine button depressed, the motor will not be stalled.

The vehicle weighs about 2,300 pounds without tonneau, and, owing to the central location of the engine, the weight carried by the front and rear tires is nearly equal, which tends to minimize the danger of skidding. The drive to the rear axle is by an enclosed shaft and bevel gears with universal joints. At 1,464 r. p. m. of the engine, the car speed figures 40 m. p. h. on the high gear. The exclusive features of the machine are fully covered by patents.

The Maxwell & Fitch Carburetor.

A new float feed spraying carburetor of somewhat unusual construction is being placed upon the market by the Maxwell & Fitch Co., of Rome, N. Y. Referring to the accompanying sectional view, the float chamber L contains a cork float acting directly on a ball valve D, at the bottom of the chamber.



M. & F. CARBURETOR.

The gasoline flows from the float chamber through the passage G to the horizontal spraying nozzle C, the flow being controlled by the needle valve I, which can be locked in position by means of a check nut H. Within the cylindrical mixing chamber is located a drum-shaped throttling valve, provided with a stem extending through the outer head of the mixing chamber, having secured to it at its outer end the lever arm A, from which connection is made either to a hand throttle lever or to the engine governor. When the engine is in operation, the suction of the piston causes air to be drawn through the mixing chamber from below, and the depression in the mixing chamber results in a mixture of air and gasoline being drawn through the passage EC, which is open to the air at E. The level of gasoline is carried slightly below the horizontal passage CE.

Some changes have recently been made in the Cameron gasoline runabout, the most important being that it is now geared lower on the high gear—5½ to 1 instead of 5 to 1.

Explosion-Proof Gasolene Tank.

The Nonex is a device which, according to public tests made recently in London, renders all receptacles containing inflammable liquids comparatively secure from explosion. The device is an application of the principle of the Davy lamp, supplemented by a fusible cap or plug.

If a vessel of ordinary type containing an explosive liquid be subjected to sufficient outside heat, or if the contents be lighted at the orifice, the walls of the tank will burst by the force of the expansion. At an exhibition given by the owners of the patent, the Non-Explosive Device Company, a 20-gallon tank was partly filled with gasoline and placed upon a lighted bonfire. The fusible screw cap, made in two parts which were simply soldered together, soon blew out, the solder having melted, and the ascending vapor caught fire immediately; but no explosion followed because the orifice of the tank formed the upper end of a tube which projected down inside the vessel to its bottom, where it closed. To allow the oil or gas to percolate from the interior of the tank, each of the metal layers of which this tube was composed had been perforated, and, while the perforations would permit the spirit to be poured out, they prevented the passage of the flames to the interior, by absorbing its heat as the wire gauze does in the Davy lamp. While the gasoline contained in the tube burned, the flame did not extend to the liquid or accumulated vapor in the half-full tank and, consequently, there was not sufficient expansive force generated to burst the tank. The flame was easily extinguished with a bundle of rags and then lighted and put out several times. An automobile tank to which the device was affixed was lighted with a match and extinguished at will. A gasoline can without the device exploded almost instantaneously when lighted.

No Impeachment Proceedings Against Cornell.

Referring to Magistrate Cornell's published statement, Winthrop E. Scarritt, president of the A. C. A., said: "Magistrate Cornell enters a general denial of the serious charges made against him. This being the case, I shall advise the governors of the club to drop the impeachment proceedings which they had instructed our attorney to begin. Judge Cornell was undoubtedly indignant, as we all are at times at the reckless driving of a particular automobilist. On the impulse of the moment he doubtless uttered remarks the trend of which he did not foresee and which, in his cooler moments, he himself admits were unwise. Judge Cornell should know that the Automobile Club of America stands with him and every good citizen in opposition to dangerous and reckless driving on the highway."

COMMUNICATIONS

Gasolene Intoxication.

Editor Horseless Age:

After four years' experience with gasolene automobiles, there occurred recently to me an experience both novel and dangerous, and because of the comparative rarity of the affection, it may prove of interest to the readers of the Horseless Age, many of whom are medical men.

While running an eight horse-power gasolene machine at governed speed in the stable one Sunday morning, for the purpose of adjusting the spark lever, we noticed that the air was heavily charged with the vapor of gasolene. We were unable to account for this, as the engine fired regularly and the spark appeared to be all right, only we were firing it very late, in order to get the lowest point for adjusting the lever. We had the engine running in all about three-quarters of an hour. There were three of us in the stable.

After finishing the adjustment, my friend, an expert machinist, and I walked across the lawn to my house, leaving the coachman in the stable. Upon reaching the fresh air, I began to feel dizzy, and after I had walked about thirty feet, my friend preceding me, I saw him begin to reel like a drunken man, and catching him in my arms I dragged him into the house and laid him on a sofa. A few seconds only elapsed from the moment I caught him until he became totally unconscious. I began to experience an intense headache and I threw myself into a reclining chair unable to do anything for my friend. After a few minutes, during which time he remained totally unconscious, I was able to sit up and he began to regain consciousness. I then went back to the stable to see what had become of my coachman, and found him experiencing no sensations whatever. I returned to the house, and when I reached my library I became faint and nauseated, and was obliged to assume the recumbent position. After taking a "high ball" to steady down the pulse, I sent my friend home in a carriage, and for five hours he suffered with an intense headache, and when he attempted to walk about the room he fell over everything in his way. A half hour after leaving the stable I had regained my equilibrium and drove about the city for about two hours, experiencing only a severe headache. I thought the fresh air would help me to eliminate the gasolene vapor which I had inhaled. Upon returning home I was again seized with a severe headache, vomited freely, and was so dizzy that I was obliged to go to bed. After a sleep of a few hours the headache suddenly left me and I was able to eat a light supper.

The coachman, who was ten years younger than either of us, experienced no ill effects until nearly six hours after the inhalation, when he was seized with vomiting and the other symptoms experienced by the rest of us.

It is interesting to note that we experienced no unusual symptoms while we remained in the stable, yet as soon as we came into the open air we were quickly overcome. How dangerous an experience of this kind might prove to a person with an abnormally weak heart may be left to conjecture.

Since meeting with this experience I have taken precaution to have the doors open in the stable when testing the engine, and I relate these cases because I feel that they may prove interesting to the readers of the Horseless Age. There can be no doubt that we suffered from an inhalation intoxication of the gasolene fumes.

Chas. H. Lemon.

[The ill effects are undoubtedly due to carbon monoxide gas, resulting from incomplete combustion of the gasolene. This gas is very poisonous, and a small percentage of it in the air breathed will cause the effects noted.—Ed.]

An Automobilist's Experience at Groton.

Editor Horseless Age:

I should like to call the attention of the fraternity to my experience at Groton, Mass., in order to save, if possible, a repetition of a very unpleasant occurrence. On July 3d, I took a party from Boston to Groton, dining there and returning in the afternoon. Everything went well, I took particular pride in showing our Massachusetts towns to my visitors from New York—historical Concord, and quaint Groton with its beautiful school. The run was in every way a success. I was particularly careful in passing through towns to conform to all known laws, and also through the country, I kept speed down when anybody or anything was in sight. Upon a good road, nothing in sight, I may have speeded up to twenty-five miles, but only for very short distances.

This was on July 3d. On July 19th, a summons was left at my house in Brookline to appear at Ayre on July 21st at nine o'clock in the morning to answer to the accusation of speeding over fifteen miles per hour in Groton. I was, of course, much astonished, as I had taken particular care while in Groton to run very slowly, and I think a great many horsemen would testify that I was particularly considerate of them. I found that I could not possibly reach Groton until a few minutes past nine, leaving my house in Brookline at an extremely early hour. I tried to have the constable serving the notice plead for me, but found that the Judge had ruled that no one could plead except the person accused, or his duly authorized attorney. The town solicitor kindly had my case postponed until the next Wednesday, when I secured an attorney, pleaded "nolo contendere," and was fined $10.00.

I took particular pains to find out just exactly where and how the timing was done, as the details of the run had entirely faded from my mind during the long interval between July 3d and July 19th. I found that the town authorities had laid an electric wire at the bottom of a small decline just inside the town limits. The measured distance was 1-10 of a mile, and an electric button had been placed at each end. I also found that the timing occurred when I was going up the hill. The authorities had selected the place where even a careful driver would probably have just released his brakes going downward, or the driver of a gasoline car would have begun to accumulate momentum to successfully negotiate the rise on his high gear. The wire was laid behind the bushes, no one was in sight, and the driver went on his way totally ignorant that his time had been taken and innocent of an intent to break the law in any way.

The law of our land holds a party innocent until proved guilty. The way in which this trap was laid, and the time expiring between the actual occurrence and the summons into court, precluded any possibility of a man proving himself innocent, and this is the point that I wish to make. Had I been summoned at the time, had I been stopped and notified that I had broken the law, and that I was to appear in the court on a certain day, there would have been time for me to have summoned witnesses, and the occurrence would have been fresh in my mind, but as it was, there was only one way to plead, and guilty or not guilty in actual fact, I was made guilty by the method above outlined. Now, I appeal to all fair-minded persons as to whether such a proceeding is honest, fair and aboveboard. Can our Massachusetts towns afford to go on record as playing such tricks, putting the innocent as well as the guilty in a trap from which there is no escape and rendering any defense absolutely impossible? I learn that the officers who did the timing shared in the fees collected, which only makes the whole matter less creditable to the parties concerned. Is it not about time that automobile owners should organize and see that the law is honestly enforced?

Now, I do not wish to make this in any way a plea for fast or reckless driving. Those automobilists who scorch through towns and past horses regardless of consequences should be not only fined, but imprisoned, and the fraternity should use its best efforts to punish such people and thereby remove the odium now attached so generally to owners of automobiles. But I do believe that neither our legislators nor the general public realize what a speed limit of fifteen miles means. To most cars, it is a jog that, if never exceeded, would

result in the sale of 9-10 of the automobiles now in existence. Almost all machines can be stopped within two lengths when proceeding at fifteen miles per hour, and as for the open country, the speed is ridiculous. If anybody interested will time himself on an electric car, even in the crowded districts of Boston, he will then realize what the speed is, and will also realize how absolutely impossible it is to have rapid transit through our streets without having this limit largely exceeded. I would guarantee to pass through any town at the rate of fifteen miles per hour, even in fairly crowded streets and not have one single complaint from any bystander, that I was proceeding too rapidly or in any way recklessly. Let horsemen time themselves on a good road in the open country and find out what this speed means.

There is just one other point that I would like to make, and perhaps some of your legal friends could answer. If a car be timed as mine was, can a man be summoned into court and fined without being identified as the driver of the car and the person responsible? It seems almost like arresting the car itself to simply take the number and summons the owner into court. Suppose I had loaned the car for the day or the car had been driven by a chauffeur, I should have been put to the annoyance and extreme inconvenience of appearing in court to prove that I was not on the car at the time. Is the mere owning of a car sufficient to make the owner liable to all these annoyances from officials hidden in the bush who receive part of the fines as their reimbursement?

JUSTICE.

Kerosene Burners.

Editor HORSELESS AGE:

Just a few more words regarding the kerosene burners. But first I wish to beg Mr. Krarup's pardon and to assure him that I did not have his article in mind when I referred to "theoretical dreams."

Secondly, I beg leave to differ with your conclusion as to form of burners, as mentioned in your comments on burners in your issue of July 27. The cooling effect of the air supply through burner is very much overrated. This is proved by the fact that nearly all old sheet steel flue burners are very much worse with regard to warping and leakage about the front portion, which shows that they have been running at a higher temperature on this side. I have seen several of these burners in which the draft was down instead of up on the front half of the burner. This was caused by the air, as it was displaced by the burner shell forming a sort of wave which did not curl up till near the back of the burner. The Locomobile people remedied this by putting vanes, like shutter slats, under the burner to scoop up the air and force it equally through all parts of the burner. Ignition of the mixture inside the burner cannot have the effect you suggest of wrecking the burner, because the mixing tube is about twice the diameter of the old gasoline burner, and the vents in the burner top are also larger. An explosion inside the burner, therefore, resolves itself into simply a puff out of the mixing tube which you couldn't hear 5 feet away. If, however, instead of a pipe or sheet steel construction which is open to the objection of requiring very narrow slots or small holes for gas vents, you use a rather thick cast iron top plate for the burner, you gain several advantages: First, the metal being thicker, it seems that the flame will not light back through a much wider slot, which makes a burner easier to make and easier to keep clean. Second, cast iron is not scaled by heat, like wrought iron pipe or sheet steel, and does not warp as much under the influence of heat. All grate bars under any steam boiler the writer ever saw were made of cast iron for this very reason. Lastly, a burner taking its total supply of air and gas through the single inlet must have a mixing tube larger in proportion to the jet of gas, and the jet of gas must enter at a higher velocity than in the ordinary Bunsen burner. This causes a higher pressure inside the burner and causes the fire to be lifted from one to two inches above the burner top, which is much more effective in keeping the burner cool, than allowing the fire to burn down close on the top plate, and trusting to the air which may or may not rise through the flues to help keep the burner cool. So much for the good points of enclosed fire-boxes. At some future date I will give you some of the difficulties and bad points, as I don't claim to have reached perfection, and I can still see places for improvement in the burners I am using.

J. FRAZIER BARD.

Explosion Engine Queries.

Editor HORSELESS AGE:

In a two-cycle cylinder of 2 inches bore by 2½ inches stroke, what should be the size of the cylinder ports, and should the bottom of the exhaust port be in line with the top of the inlet port? Is a ⅜-inch pipe size connection to both ports large enough? The cylinder is made of machine steel with flanges one inch deep. Can it be turned down to 1/16 inch thickness of cylinder wall? G. A. L.

[There are very few engines of this type and size made, and the proportions have not yet been well standardized and will have to be determined largely by experiment. We would suggest that you make the exhaust port ½ inch long in the direction of cylinder axis, and the inlet port 5/16 inch long, and locate the two so that the exhaust valve will open ¼ inch before the inlet port opens. Make both ports as wide as possible, say 1¼ inch with a ¼ inch bridge at the center. A thickness of 1/16 inch is easily sufficient for the main part of the cylinder, but a greater thickness will be necessary where the ports come, as more than half of the metal around the cylinder is cut away there. A ⅜-inch pipe size connection for the inlet and exhaust is too small. The exhaust pipe should be of ¾ inch clear diameter, and the inlet pipe of ½ inch.—ED.]

Editor HORSELESS AGE:

Will you kindly tell me which has the greatest cooling capacity or capacity for carrying off the heat in an air-cooled gas engine—ribs cast right on to the cylinder or separate flanges of sheet metal, punched or bored out to make a close fit to the cylinder when turned down on the outside, the distance apart being average? G. H. B.

[When sheet metal flanges are fitted they are always placed closer together than flanges could possibly be cast on the cylinders, and as separate flanges are always used for air-cooled cylinders of larger size, there is no doubt that a better cooling effect can be obtained by this method of construction, provided, of course, the flanges are brought into intimate metallic contact with the cylinder wall.—ED.]

Legislative and Legal.

The City Council of Galesburg, Ill., recently adopted an automobile ordinance re quiring numbering, etc., in spite of the veto of Mayor Shumway.

Frank E. Strom and J. J. Kelleher, of Salem, Mass., recently won a victory over the Boston police in a trial for exceeding the legal speed limit.

Emil Martens, of Chicago, has begun suit against W. M. Doolittle for $10,000 damages for personal injuries caused by his being run over by the defendant's car.

Automobile speeding has become a political issue in northern Indiana. The farmers are organizing to prevent the election of Legislative candidates who will not pledge themselves to pass strict laws for the operation of automobiles.

Coroner Wallace, of Hempstead, N. Y., in his decision in the inquest held over the deaths of the three men who were killed on July 12 while crossing the tracks of the L. I. R. R. in an automobile, absolves the engineer on the train from all blame, censures the railroad company for not providing proper gates at the crossing and finds that the victims did not exercise proper caution.

Joseph Gunther, who had been arrested by the police of Evanston, Ill., for exceeding the speed limit, was released by Judge Hanesy on habeas corpus proceedings, the court holding that the speed gauge used on the automobile was better evidence than the watch of the police who made the arrest. Two men who were with Gunther testified that the car was going at the rate of eleven miles an hour when stopped.

MAINTENANCE AND REPAIRS

Attaching and Detaching Clincher Tires.

Although the exact method of procedure in any given case is dependent largely upon conditions peculiar to that case, such, for

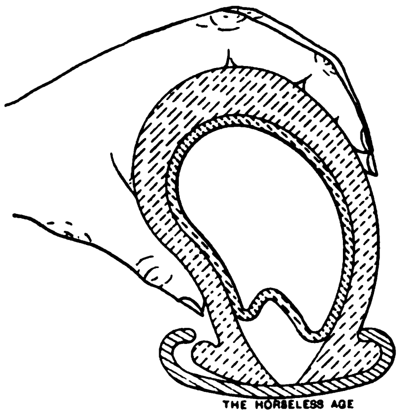


FIG. 1.

instance, as the ease with which the tire can be reached under the mud guards, etc., and the climatic conditions under which the work must be done—there are certain general rules which should be followed, and possibly some "useful hints," based on practical experience, which may be taken advantage of to make the attaching or detaching of clincher tires a task less burdensome.

Before any effort is made to detach a tire it is essential that absolutely all of the air pressure within the tire be released. This can best be done by removing the plunger completely from the valve, by means of the miniature screw-driver or spanner formed in the end of the valve cap. The alternative of holding the valve open with a pointed instrument is more laborious, and not nearly so efficient, either in point of time consumed or in the thoroughness with which the air is expelled.

Next remove the nuts from the retaining studs and valve stem, and push the studs and the stem through the rim and, if possible, entirely clear of it, using a small rod to complete the operation. If the studs are

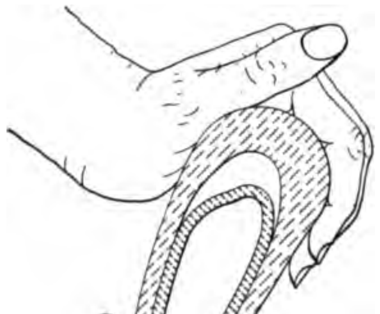


FIG. 2.

only partially released, they are apt to seriously interfere with the clearing of the shoulders on the shoe from beneath the edges of the rim. When all nuts are removed and the shoe cleared, grasp the tire with both hands, the thumbs pressing against it near the outside edge of the rim. Pull the top of the tire outward, and at the same time press inward with the thumbs against the lower part to clear the tire beneath the edge of the rim (Fig. 1). Next, as part of the same operation, push the top of the tire in toward the car and down toward the bottom of the opposite wheel, until a space is visible between the tire and the rim of the wheel (Fig. 2). Continue this operation completely around the periphery of the tire before attempting to use the levers.

It is usually possible to apply greater strength in this manipulation if the wheel rests on the ground, and the axle should therefore not be jacked up until the operation is completed.

While pushing the top of the tire in toward the car with one hand, insert the end of a lever between it and the rim, after the manner shown in Fig. 3. Push the lever down until it assumes a horizontal position

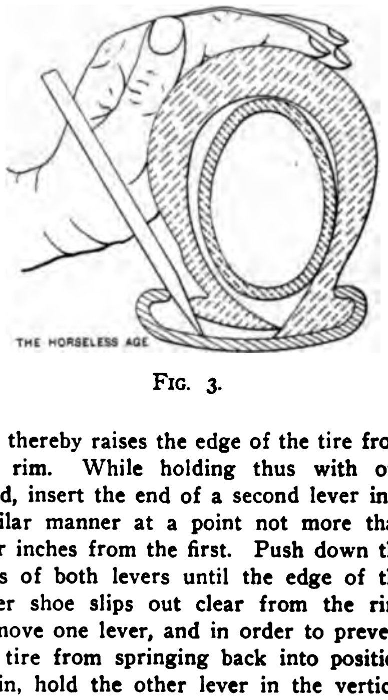


FIG. 3.

and thereby raises the edge of the tire from the rim. While holding thus with one hand, insert the end of a second lever in a similar manner at a point not more than four inches from the first. Push down the ends of both levers until the edge of the outer shoe slips out clear from the rim. Remove one lever, and in order to prevent the tire from springing back into position again, hold the other lever in the vertical position by grasping a spoke with the same hand. Insert the free tool beneath the edge of the tire again and pry off another short length. The smaller the length of tire cleared from the rim each time, the smaller will be the physical exertion necessary to accomplish it.

If it is desired to repair or replace the inner tube, it is doubtful if much time or labor is saved by removing simply the outer edge of the shoe. In fact, it is desirable for many reasons to remove the tire completely. It is accomplished comparatively easily after the first edge is detached, and a more careful inspection of the inside of

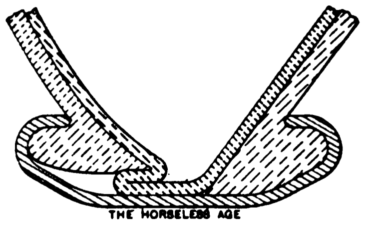


FIG. 4.

the shoe is possible when it is off the rim. Again, there is less likelihood of pinching or creasing the inner tube while replacing. If the tube is caught either between the rim and the outer shoe, or between the outer shoe and a retaining stud, in the manner shown in Figs. 4 and 5, trouble is sure to result, and if the tube is carefully fitted within the shoe and partially inflated while the shoe is completely detached, there is less chance for this "pinching" to occur than there is when the tube is worked little by little into the shoe as it remains on the rim. Only a very slight inflation is necessary, and if too great a pressure is pumped up the operation of attaching is made more difficult.

On replacing the tire, first insert the valve stem in its proper hole and work the shoulders on the tire in under the edges of the rim for a distance of about three inches on each side of the valve. Run the nut on the valve stem down to the rim so that the valve is held in its proper position. Turn the wheel until the valve is at the lowest point and then lower the jack so that the wheel touches the ground and is prevented from turning easily. The retaining studs nearest the valve stem can be fitted with their heads in the proper position between the lips, as they may be called, of the outer shoe and the inner tube. They can be directed into the holes in the rim as the tire is pushed on in both directions up to the top of the wheel. The other studs should be placed in the rim and held from falling out by running the nuts on for a few threads. In some cases it is possible to work the two studs nearest the valve stem through the rim far enough to catch the nuts before it is necessary to resort to the levers. This should be done when possible as it will, of course, prevent them from working out of position again. They should not be drawn tight, however.

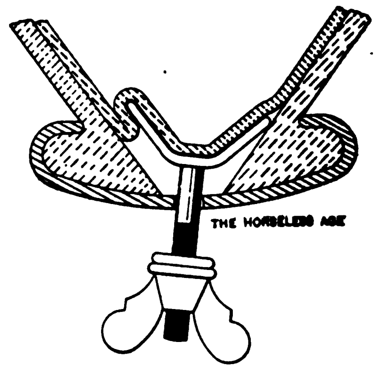


FIG. 5.

ttle by little the shoe should then be ked on to the rim with the aids of the rs, first the inside edge, then the out- edge. Fit the heads of the retaining s into their proper places before work- the shoulders of the shoe under the s of the rim, taking care that the inner is not "pinched." Fit the portions of tire between the bolts under the edges he rim after the portions at the bolts been so fitted. The nuts on the re- ng studs should then be run up lightly the fingers and the tire fully inflated. mmer well with a lever to insure the er fitting of the tire at all points, and ly set up the nuts on the retaining s reasonably hard, using a small wrench the purpose.

The Cudell Alcohol Motor.

ne race for alcohol motors in the track at Frankfort-on-Main, following the don Bennett race, was won by a Cudell fitted with a four-cylinder 16-20 h. p. or. A few of the special arrangements acilitate the use of alcohol as fuel may of interest to our readers. Two car- tors are provided, one for starting, with line, and the other for regular opera- with alcohol. The carburetors are lo- d at the side of the crank chamber op- te the valve chambers, and there is, equently, a long inlet pipe. The latter acketed for the greater part of its th, the water from the top of the cylin- jackets being led into the pipe jacket he upper end, and flowing from the r end of the pipe jacket to the top of radiator. A sheet metal screen is placed een the radiator and the motor, in r to prevent the draft through the ra- or unduly cooling the interior of the net and preventing thorough gasification ne alcohol. All valves are mechanically ated. An oil tank is built into the dash- d in such a manner that its major por- is within the bonnet space, which has advantage that, in cold weather, the oil pt fluid by the heat in the bonnet.

ALONG THE CANAL IN BRUGES.

The Ostend Week and Ardennes Races.

In July each year, when the season in Ostend, the Belgian coast resort, is at its height a week of automobile events is held there, comprising record speed trials, tours and sundry competitions; and this week is followed by two days of racing over two circular courses in the Belgian Ardennes, a long one for the big cars, and a short one for voiturettes and motor cycles. This year the Ostend week began on Thursday, July 14th, and the Ardennes race was held on July 24th and 25th.

The first event on the program, on Thursday, July 14th, was a five kilometer race for touring cars on the road between Nieuport and Snaeskerke. The weather was splendid, and the attendance exceptionally good. The vehicles were classified according to price of chassis, there being classes for chassis up to $800, $1,200, $2,000, $3,000, $4,000, $6,000 and above $6,000. Of the 43 cars entered, 25 started, and Belgian, German, French and Italian makes were represented. In most of the classes the records established last year were broken. In the class for vehicles up to $4,000, the first prize was won by Delville on a Gardner-Serpollet steamer, in 4 m. 17 s.; in the class for vehicles up to $6,000, by Hautvast on a Pipe, in 3 m. 14 1-5 s.; and in the class for vehicles over $6,000, by Baron de Caters, on a Mercedes, in 2m. 52 3-5s.

On Friday a ten kilometer race for racing cars was held over the same road. The course included one rather dangerous turn, and a very rough roadway over a bridge at the middle of its length. In this race the cars were, of course, classed according to weight, in accordance with the racing rules of the A. C. F. In the class for racers weighing up to 1,000 kg., the best time was made by Rigolly, on a Gobron-

BETWEEN OSTEND AND BRUGES—OSTEND WEEK TOUR—BEGUINAGE PROMENADE, BRUGES.

Brille, viz., 4m. 39s., which is a new world's record for the distance. A number of the cars met with mishaps on the rough bridge. Rigolly broke a tube at this point, and Baras, on a Darracq, broke his seat, and was in doubt for a while whether he would be able to continue.

The third day was devoted to a tour over the route Ostend-Bruges-Blankenberghe and back, a distance of about fifty miles. The procession was headed by Baron de Caters and was participated in by about 30 vehicles. Our photos show a number of incidents along the route. The run was interrupted by stops for luncheon and dinner.

On Saturday took place the weighing-in for the standing mile and kilometer trials which were held on Monday and Tuesday respectively. Among the new vehicles entered for these trials was a Darracq, driven by Baras, which was claimed to be good for 170 km. per hour. In the mile race from standing start, on Monday, a new record of 48 3-5s. was established by Baras, who is said to have attained a maximum speed of 160.7 km. per hour. A new world's record for the standing start mile for light cars was made by Hanriot, Bayard-Clement, viz., 56s. On Tuesday the kilometer race was held on the bridge of Snaeskerke, when the kilometer flying start record of 21 3-5s. was established by Rigolly, as already reported in the HORSELESS AGE. Baras made a time of 22s.

On Saturday took place the weighing in for the Ardennes race, at the freight depot in Bastogne. Many of the cars proved to be too heavy and had to remove parts before they could come inside the limit. Thirty-four cars in all were weighed in, including four Panhards, four Hotchkiss and four Mors (four being all the cars of one make allowed to be entered by the rules).

On Sunday, July 24, took place the race for voiturettes and motor-cycles. The course for this event was 150 miles in length, consisting of five rounds over a circular route starting and ending at Arlon. There were only two starters in the voiturette class—Edmond, in a Darracq, and A. Clément in a Bayard-Clément. The start occurred on the worst part of a sharp curve, where the competitors were forced to slow down. Behind the barriers which protected the road crowds of spectat. were collected, many having come eve from Paris. What made the curve the more interesting was that several supply depots had been placed in proximity to it, and the competitors stopped from time to time for tires, gasoline, water, etc., and one was able to note the little misfortunes of each one. Young Clément stopped for supplies, while Edmond broke down on arriving after his second turn.

The many visitors in the little town of Bastogne on Sunday evening were in festive mood, and those who tried to rest through the night in their cars on the central square were disappointed. First a torchlight procession marched through the town, then music raged, and had it not been for a very serious thunder storm, which cleared the streets, the fortunate ones who had secured a room would not have been able to obtain any rest.

It rained heavily until two o'clock, which more than laid the dust, and certainly spoiled the road somewhat. Gradually towards three o'clock a few cars careered about, making a roaring noise, and were soon augmented by the 100-h. p. cars getting ready for the start. At 4:30 A. M. everyone had assembled near the control or on the roads leading from it, and as the hour of starting approached the tribunes were packed.

Heath, on a Panhard and Levassor car, was the first to get off, and rushed away on his journey amidst cheering. The others were sent away at regular intervals of two minutes, except Amblard on a Hotchkiss car, who was five minutes late in getting his motor to start. In all thirty-three started, twenty-six heavy and seven light cars.

When the last car had been despatched speculation was rife as to the time in which a car would complete the circuit, and a quarter of an hour later, roughly speaking, a shout signalled the arrival of a car on top of the hill towards Martelange, down which it glided. It was Heath, who had started No. 1 on the Panhard, and had completed the circuit in 1h. 17m. 30s. The best time in the first lap was made by Duray (Darracq) in 1h. 12m. 53s., or an average of better than 100 kilometres per hour. Tart on a Panhard was next in performance. A telephone message announced that at about one kilometre from Saint Hubert, Amblard was stalled, but would not abandon the race. All the competitors passed at a high speed, and took the turning after the tent remarkably well, except Weiler, who almost missed it by skidding badly to the side of the public. They received a fright, though no one was hurt.

Heath again was first to complete the circuit, but the best time was made by Teste on a Panhard in 1h. 10m. 59s. The leader was Henri Farman, with a total of 2h. 28s. 21s. Hautvast on a Pipe abandoned the race in consequence of a short circuit. Jenatzy, also on a Pipe, arrived, but was obliged to give up in consequence of leakage from his tank and other trouble. Rigolly had a burst tire when he passed, but repaired it quickly, and started off amid increased excitement.

Heath again passed first in the third lap; but the chief point of interest of this turn was the jumping forward of Le Blon, on a Hotchkiss, who beat the other car of the same firm which was before him in the second lap, and was steered by H. Fournier. Le Blon had the same machine that did the one kilometre at Ostend at the rate of 142 kilometres per hour, and he completed the third lap in 1h. 9m. 44s.—the best time of

THE OLDER AND THE YOUNGER CLEMENT, AND CLEMENT RACER.

BARON DE FOREST, DE DIETRICH.

Circuit Des Ardennes—Descarte, Motorcyclist, Taking a Curve.

the day. The excitement increased as Le Blon became one of the favorites. The race ran close between a Clément-Bayard and the Panhards.

Clément came in first, and was delayed by a puncture. Heath passed next, then Teste, Farman and Leger. A rumor was received that an accident had happened to Achille Fournier, but it was only car troubles. As everyone was getting impatient the trumpet suddenly announced a car, which turned out to be the Panhard driven by Heath, who arrived amid loud cheering. Next came Clément on No. 3, and then Teste, who arrived minus a tire from one of the rear wheels. Rigolly, Le Blon and others followed until the first of the light cars came in. This was a Darracq driven by De la Touloubre. Heath completed his last lap in 1h. 11m. 20s., his average being 92 kilometres per hour throughout the race.

Foreign Notes.

Owing chiefly to King Edward's preference for automobiles, many of the employes at the Royal Mews at Windsor have been discharged, and a number of horses disposed of.

"Salvation by Motor" is promised the English people by the Salvation Army. General Booth, of the Army, will start on August 9 with an automobile from Landsend to Aberdeen, visiting 62 towns en route.

A plate bearing the Imperial Crown and a monogram of the German Automobile Club has been presented to Emperor William on behalf of the club by Baron von Brandenstein. The plate is intended to be affixed to the Emperor's automobile.

The first Hungarian automobile manufacturing concern has recently come into existence by the transformation of the carriage works of Schreil & Mittelmann, Budapest, into the First Hungarian Carriage & Automobile Manufacturing Co.

A special train for motor-cars, carriages and horses is the latest railway novelty in England. This service will be commenced in a few days, and the train will run daily at 4.40 p. m. from St. Pancras on the Midland Company's system to Glasgow and Edinburgh. It will take up vehicles and horses en route.

Some of the local authorities in the West of England are demanding that the railway companies running motor 'bus services shall make a special contribution to the upkeep of the roads thus traversed, but the companies repudiate any such liability. From 700 to 800 passengers are being carried daily by the Great Western motor cars between Slough and Windsor.

The latest car of the King of England, a 24 h.p. Daimler, is at present completing its final tests at Coventry. The body has been built by Messrs. Hooper, and though the vehicle has a somewhat unwieldy appearance, like most covered cars with an exaggerated wheel-base, the finish and workmanship are naturally of the best. The car will carry seven persons in all, two on the front seat, and five inside, two of the latter being provided with big swinging armchairs.

An automobile sleigh, invented by a Russian engineer, M. Konstantinoff, for use on Lake Baikal, has just been delivered to Prince Khilkoff, who has ordered it to be put to practical tests. This sleigh is intended to travel equally well upon water, ice, or land; it is in the form of a ship mounted on four movable skates for use on ice; these "runners" can be replaced by three wheels for use on land, one wheel in front serving as guide. The vehicle can carry a load weighing nearly eight tons.

The Fire Department of St. Petersburg, Russia, is about to adopt mechanically propelled fire engines on the Deschler system. Trials in Hanover and Berlin, as well as the motor tested at the "Alexandronevski" station on June 30th, have demonstrated not only this possibility, but the great advantage to be gained from an economical point of view by the change, since the town will be saved the expense of maintaining a large number of horses. The new fire station at the circus will be the first to be transformed.

The London volunteer companies of the Royal Army Medical Corps made an experiment on Mitcham Common on July 9 to test the utility of automobiles in removing wounded from a field of battle. Fifty boys acted the part of the wounded soldiers, and the work of collecting them, dressing their supposed injuries and removing them to the field hospital, a mile and a half away, occupied ninety minutes, or less than half the time it would have taken if wagons had been used. There was also a minimum of vibration.

The Automobile Club of Great Britain and Ireland has decided to challenge for the Gordon Bennett race of next year. But with the challenge is coupled the following resolution: "That any racing car, designed to comply with the existing racing rules of the Automobile Club of France, which may be driven on the public highways above the legal limit of the United Kingdom, unless authorized, shall be liable to be disqualified by the Automobile Club of Great Britain and Ireland from taking part in the Gordon Bennett race or any other race, and that the liability to disqualification shall also extend to the owner and the driver of the car in question."

The St. Louis Tour of the American Automobile Association.

Summary of the First Week.

The comparative statistics of the various cars entered that reached Buffalo are most interesting. Of the 23 machines in the garage there, 19 were of the touring car class, light and heavy, and but three of the strictly runabout type, i. e., not fitted with a tonneau. Three of the cars were of foreign make, and the remaining nineteen of American manufacture. Nine cars were fitted with four-cylinder motors, five with double-cylinder motors, either opposed or upright; three with single cylinder motors, and five with compound steam engines. Fourteen cars were over 10 h. p., and 13 fitted with motors developing 10 h. p. or less.

Of the troubles and delays met with en route the following list is interesting: Five cars experienced ignition troubles, eight had tire troubles, three were delayed by breaking of driving chains, three cars were ditched as a result of skids on bad roads, one car had lubrication trouble, and one was delayed as a result of the motor overheating.

Two axles were bent and two broken; six cars were delayed at various stages by running out of gasoline—it was reported. In some cases the cars were really held up by engine troubles, but the operators very wisely gave out the cause of the delay as lack of gasoline. This reason has now become a standing joke, however.

There is no question but that this run will furnish much interesting data on the endurance and working ability of the various makes of cars. Panhards, Mercedes, Napiers, the imported, were running daily in competition with Pope-Toledos, Columbias, Franklins, White steamers, and even Cadillac and Oldsmobile tonneaus, and, completing the same schedules each day, should furnish thought for quiet consideration.

Eight-hundred-dollar single-cylinder tonneau cars are carrying equal passengers and baggage weight with $15,000 four-cylinder road monsters under the same conditions, and finishing at each night's stopping point with equal reliability and within nearly the same length of time.

Buffalo to Erie.

By making a start at five o'clock Monday morning, James M. Waters, Panhard, succeeded in reaching Erie, Pa., at nine o'clock, covering 94 miles in that time. He stated that he had killed seven chickens en route, being unable to stop for them. The other contestants also started rather early, and at noon a Pope-Toledo, a Pope-Hartford, four Whites, the Franklin and the Columbia were all in front of the Reed House, the first day's run of the second week of the great tour being completed. The other cars straggled along until late Monday evening, when Charles P. Scott, Peerless special, and A. D. McLaughlin, Royal tourist, came in. Both had made late starts—Scott, owing to the fact that his car was being overhauled at Buffalo, the connecting rods and bearings being taken up, and it was not ready at the time promised. McLaughlin had experienced minor engine trouble en route.

ILL-REWARDED KINDNESS.

Mr. Scott had the rather disagreeable experience of being towed into Erie, he having met with an accident nine miles out of the city, a steering knuckle bending going over a jounce and putting his steering gear out of commission. He telephoned to the Reed House, and Harlan W. Whipple started out in his Mercedes car to his assistance. G. J. Bradley, of the Diamond Tire Company, accompanied him. Scott's car was reached in good time and some preliminary repairing done. Mr. Bradley was sent down the road to a farm house to borrow a pail, and after everything had been fixed up and the two cars were ready for the start, Bradley hurried back to the farm house to return the pail. In some way or other both Mr. Whipple and Mr. Scott had forgotten all about the obliging tire man, and started away without him. Bradley was obliged to walk the nine miles back to Erie, and arrived when the sun was about up, footsore and weary, and vowing that he would never attempt to help out another automobilist again.

Secretary Tucker announced at Erie that he had received a dispatch from John Farson, of Chicago, president of the Chicago A. C., stating that he would join the run at South Bend, Ind., on Friday. Seven cars are expected to join the party at Chicago.

There was considerable indignation at the Reed House over the hold-up of Mr. Glidden, who was compelled at the muzzle of a loaded gun to pay a dollar for a chicken killed by a car which had passed in front of him. Many of the more conservative of the tourists deplored the reckless slaughter of chickens, ducks, etc., and concurred in the opinion that the farmer's act in defending his property, although unduly strenuous, was not altogether unjustifiable, as the tourists were all traveling at high rates of speed.

At Erie Tom Fetch, who drove "Old Pacific" across the continent, joined the party in a 24 h. p. four-cylinder Packard car, intent upon going through to St. Louis unless he receives orders from the factory to turn back. Fetch agreed to start out of Erie Monday at midnight to scatter the confetti over the route to Cleveland, and got away on schedule time for that purpose.

SPIRIT OF RIVALRY DOMINANT.

The greatest jealousy exists between the drivers of the high-powered cars about getting into towns first, and this has caused the tour to develop into a mad race between cities, in which all restriction and speed ordinances are totally disregarded. In order to be in first at the various places, the drivers of cars think nothing of making a start at three or four o'clock in the morning. James M. Waters set the example in the run from Buffalo to Erie. A number of cars made this run in four hours, and the roads were strewn with chickens and other fowl they had killed. Absolutely reckless, some of the drivers risked not only their own lives, but endangered many people in other vehicles. The fact that racing had been expressly forbidden was forgotten, and the owners of the big cars gathered in the lobby of the Reed House and compared the times of their runs, and told how much better they could have done had they pushed their cars.

ROUTE AND ROADS.

The route of the run was from Buffalo to Wanakah, Evans Centre, Farnham, Irving, Silver Creek, Sheridan Centre, Fredonia, Brocton, Westfield, Farsythe, Ripley, State Line, North East, Moorhead, Harbor Creek, Wesleyville and Erie. The roads were in good condition, with the exception of a few places where they were deeply rutted. In one bad hole, George H. Lowe, White, bent his front axle badly. He was able to get into Erie, where the axle was temporarily straightened and stiffened, and it will be replaced with a new one at the White factory in Cleveland.

Two rear springs on Mr. Glidden's Napier car were badly weakened by the jolting of the first few days' run and threatened to break. He straightened them temporarily and will have new ones shipped ahead to be put in. The chain on the Buckmobile had broken en route to Erie and caused some delay.

Barney Oldfield, the well-known racer, had joined the crowd at Buffalo with his Peerless car and had signified his intention of running with the tourists to Erie. He was expected at the Reed House until a late hour, when word was received from him to the effect that he was unable to make the run, having been called away in another direction.

The confetti car had not marked the roads very well on the way to Erie, and the tourists reported that the old Endurance run arrows were still in position and proved a great help to them. Twenty-five cars started from Buffalo and all arrived at Erie. Six are running over the National highway.

Webb Jay, Augustus Post, Ray D. Lillibridge, Carl Page and George H. Lowe, driving the White steamers, held a confer-

ence at the Reed House Monday night in regard to the refusal of participants to stay back on Tuesday morning and allow them to enter their home city of Cleveland first. By courtesy the Franklin car went into Syracuse first, and the Pierce car into Buffalo, and the White people believed that they should have the same consideration as the others.

REPORTS IN THE DAILIES.

There had been a strong undercurrent of feeling between the owners of the big cars because A. L. Pope, Pope-Toledo, had been sprinting into all the night stops and scooping all the free newspaper advertising. The reporters in the big cities invariably photographed the first car in, and devoted half a column or more to telling about its great run, and then followed this with a line about each of the other cars, noting the fact that they had also arrived. It was the rivalry to secure this sort of advertising that resulted in the early morning starts and racing.

The men with the White cars decided that they would be the first in at Cleveland at all hazards, and to start Monday evening at 11 P. M. and drive all night. Mr. Post, despite the fact that he heads each day's run, was on hand with his car, and the party started off. It was, of course, not the object of the tour to have any performances of this character, and from present indications the rest of the trip will be a grand record-smashing, devil-may-care race.

Erie to Cleveland.

At midnight Tom Fetch started out for Cleveland to throw the confetti. At five o'clock in the morning James Waters was started in his Panhard car, resolved to burn up the roads to Cleveland. A short time later George Soules followed in the Pope-Toledo, Harold Pope in the Pope-Hartford, and D. B. Huss in the Olds tonneau. The others followed along at irregular intervals, all who had reached Erie starting for Cleveland. G. T. Thompson, of Canandaigua, N. Y., 20 h. p. Winton, started from Rochester, N. Y., on Saturday and reached Erie, Pa., Monday night. He accompanied the party on Tuesday, and will go through to St. Louis, accompanied by his wife, son and father.

The five White steamers made a moonlight race to Cleveland, and were given a great send-off in their home town. The Royal tourist, also a Cleveland car, had followed them, leaving Erie a few minutes before 11 o'clock on Monday night for this "go-as-you-please" jaunt. Tom Fetch led the way in a Packard car to strew confetti, and the whole party got off the right road several times before Cleveland was finally reached.

The tourists who left Erie in the early morning hours reached the Hollenden House at Cleveland about noon, Eastern time. One of the largest crowds was present to greet them, the demonstration being twice as enthusiastic as that at the start in New York. Each car that came in was at once surrounded by the crowd, and the occupants were asked all sorts of questions, as to the condition of the roads, the time consumed in making the run, and like matters of interest.

The roads from Erie to Cleveland were reported to be in fair shape. Several sandy spots were met with, and also a number of bad stretches, where the roads were being repaired. The distance was 110 miles, and a number of the cars negotiated it in less than five hours. There was on the whole not as much racing as on Monday, and the casualties to fowl were light.

James L. Breese, Mercedes, was one of the last to leave Erie. He had been obliged to take his car apart, owing to some wear in the flywheel bearing and gear bearings, that had to be taken up. R. P. Scott, 70 h. p. Peerless special, sent word by Mr. Breese to the effect that the damage to the steering connections on his car was being repaired, and he would be along later. H. M. Adams and Bert Phillips, of Cleveland, made the run to Erie scattering confetti and returned Tuesday evening.

Harlan W. Whipple had a rather hard time of it in his Mercedes car running from Erie to Cleveland. When near Conneaut his motor stopped and could not be started again. The trouble was found to be in the magneto. but it took over seven hours to locate it. Mr. Whipple did not arrive at the Hollenden until ten o'clock, Eastern time, tired out and disgusted.

It was arranged on Tuesday evening that the pilot car should leave Cleveland for Toledo at 2:35 Wednesday morning, carrying 150 pounds of confetti to be scattered over the roads. By special arrangement with the touring committee, Harold L. Pope, Pope-Hartford, was allowed to leave Cleveland for Toledo shortly before noon on Tuesday, his home being in that city. Mr. Lesh, Pope-Toledo, and A. L. Pope. Pope-Toledo, also started from Cleveland early Tuesday afternoon. Percy F. Megargle, driving the Elmore-Pathfinder, was also given permission to deviate from the schedule and run his machine to the Elmore factory at Clyde, Ohio, starting at two o'clock Tuesday afternoon. This car has run 3,400 miles since last leaving the factory, and is now making its second trip to St. Louis and return. It will be fitted with a new driving chain and will be thoroughly overhauled. A gang of men will do the work quickly, and the car will join the run and finish with the rest Wednesday evening at Toledo.

W. C. Temple, of Pittsburgh, accompanied by his wife, joined the party at Cleveland in his Pierce Great Arrow, and will complete the run. Mr. and Mrs. Wallace, of Pittsburgh, made the run via Youngstown to Cleveland, and will continue with the crowd to the Fair city in their Rambler 7 h. p. runabout.

The ladies of the party were taken charge of by Mrs. Windsor T. White at the Hollenden on Tuesday evening, and were taken in private automobiles to the Country Club, where luncheon was served in their honor, and where they were all entertained, returning to the hotel at a late hour.

At Cleveland.

The members of the Cleveland A. C. were on hand with their cars to take all persons who desired around the city. A number of the tourists availed themselves of the opportunity to ride in some one else's car, and were taken for a spin to some of the large automobile factories and the parks of the city. They were well received, and were shown the various 1905 models now being constructed. The Cleveland Automobile Club's rooms in the Hollenden were thrown open for the use of the tourists, and the official headquarters were fixed up there.

An announcement was also made to the effect that a beefsteak supper would be served at the Hollenden in the evening, to which the White Sewing Machine Co. invited the tourists. It proved to be a most enjoyable affair, a great number of the tourists being on hand. Speeches were made by Windsor T. White, A. L. Tucker, Augustus Post, James L. Breese and others present. A unanimous vote of thanks was tendered to Mr. White for his courtesy to the tourists. The affair did not break up until late in the evening.

The White cars, the Franklin and the Royal tourist were all overhauled, and the Pope-Hartford and two Pope-Toledos will be given attention at the factory in Toledo and prepared for the remainder of the tour. Mr. Lesh's car has behaved badly on one or two occasions, and it was for the purpose of having the factory experts look the machine over that he started on the Toledo run so early.

It was rather late when the crowd retired, most of them leaving calls for early in the morning, in order to make a prompt start on the big run to Toledo. The favorite time for getting under way was between 6:30 and 7:30 A. M., Eastern time.

Cleveland to Toledo.

Wednesday dawned bright and clear, with every indication of a fine day. Some of the cars got off at 4 A. M., believing the run would be a very hard one. The run is 110 miles over roads reported to be good. It is the longest single trip of the tour.

The following cars having reached Cleveland Tuesday night, left for Toledo. Those followed by an asterisk joined the tour at Cleveland:

Whipple. Mercedes; Gillette, Pope-Hartford; Page, White; Johnston, Peerless;*

Post, White; W. C. Temple, Pierce Great Arrow; Glidden, Napier; Waite, White;* Breese, Mercedes; Lesh, Pope-Toledo; Birchwood, Haynes-Apperson; Lowe, White; Lillibridge, White; Jay, White; Megargle, Elmore; Gifford, White;* Hurlburt, Cadillac; Manross, Columbia; Wallace, Rambler;* Esselstyn, Franklin; Waters, Panhard; Pierce, Pierce Gt. Arrow; Huss, Oldsmobile; Gates, Winton;* H. L. Pope, Pope-Hartford; A. L. Pope, Pope-Toledo; Seaton, Buckmobile; McLaughlin, Royal tourist; Hoag, Covert; Dyer, Winton;* Blakeslee, Winton;* Collings, Peerless;* Thompson, Winton.

The roads between Cleveland and Norwalk were lumpy and sandy, and the machines had a hard time negotiating them. Beyond Norwalk they were better. There was one serious accident during the day, and that happened to Mr. Wallace, who, with his wife, was driving in his Rambler runabout. Mr. Wallace seemed to be slightly rattled, and a few miles out of Cleveland allowed his machine to bump into the rear of the big Columbia car. No damage was done, however. A few miles further on, while attempting to speed past a White steamer, Mr. Wallace drove too near the edge of a gully and the ground crumbled under his wheels, allowing the car to slide down the gully, throwing both Mr. and Mrs. Wallace out and overturning the machine. Luckily, neither one of them was hurt, although both were badly shaken up and bruised. Other tourists following stopped and helped to right the car, which was pulled out of the gully and brought up on the road again. Strange to say, it was found that nothing had been broken, and the machine continued toward Toledo. Mr. Wallace's desire to pass the White car had caused the accident, the fault lying entirely with him.

Mr. Whipple's Mercedes car was delayed en route by tire troubles. Birchwood, in the Haynes-Apperson, had ignition troubles and also bent his front axle. George H. Lowe and Augustus Post, both driving White steamers, broke rear springs. Mr. Post was able to get in on his spring, but Mr. Lowe had to take the spring out and put a wooden block in its place. Dr. Gifford, White, also had tire troubles, and lost some time en route. R. H. Magoon and H. L. Ferguson, of Cleveland, accompanied the party to Toledo and turned back from there. Albert L. Pope, A. J. Lesh and Harold Pope, each driving a Pope car, were in Toledo Tuesday night, having made the run without mishap.

Late Wednesday morning the big Peerless 70-h.p. car, having reached Cleveland, was prepared for the run to Toledo and started over the 121-mile course, taking things easy and hoping to catch up with the main party at Toledo. Some of the cars were off for Toledo before 5 o'clock, making the early start in order to be in at Toledo in good time.

The run was divided into two parts, with a noon halt at Norwalk, Ohio, 55 miles out of Cleveland. Most of the cars stopped there and were given a warm welcome, the whole town turning out to greet them. George S. Waite also started before daylight in the pilot car to scatter confetti. D. B. Huss, accompanied by Ed. Spooner, made a 5 o'clock start, Mr. Huss desiring to visit his home, which is located along the route.

At Toledo.

Mr. Pope desided to reach Toledo ahead of the tourists, in order to make arrangements for their entertainment. It had been arranged to give a special dinner and theatre party to the crowd, with the compliments of the Toledo Automobile Club and the Pope Manufacturing Co. Special trolley cars stopped at the Boody House at 6.30 P. M. to take the party to the farm where the dinner was served.

At the farm they were welcomed by Edward J. Marshall, president of the Toledo Automobile Club. Charles J. Glidden was named as toastmaster, and made a short address, as did Mr. Whipple and others. After the dinner, the party attended a theatre and were later brought back to the Boody House in the special cars, voting the Toledo boys jolly good fellows.

There are eleven ladies in the party to date, they being the Mesdames C. J. Glidden, Boston; H. W. Whipple, Andover, Mass.; C. H. Gillette, New York; M. L. Downs, New York; H. F. Lesh, Boston; W. C. Temple, Pittsburg; Wallace, Freeport, Pa.; Waite, Collins and Blakeslee, all of Cleveland, Ohio. Mrs. Raymond Lipe and Mrs. Peter O'Donahue, of Toledo, were selected to entertain the visiting ladies, and did so, serving a dinner in their honor and joining the theatre party with them later.

There were many amusing scenes at the Boody House when the invitations for the dinner were handed out. These invitations were printed in the form of subpoenas of the United States Circuit Court, and were served on the tourists by two stalwart police officers in full uniform. As a car arrived, the men in it were allowed to go into the hotel, and were then approached by the officers and served with the formidable looking legal documents, being told either that they had exceeded the speed limit or killed a dog en route, and would have to appear in court and answer for that offense.

It was amusing to hear them all protest their innocence before reading the subpoena and realizing that the joke was on them.

This novel invitation was signed by President E. J. Marshall, of the Toledo Automobile Club, and read as follows:

"The United States of America, State of Ohio, City of Toledo, ss.:

"The President of the Toledo Automobile Club to ————

"Greeting:—For divers and sundry reasons appearing sufficient unto us, we command and strictly enjoin you, that, laying aside all matters whatsoever such as bum spark plugs, flat tires, bad roads or short circuits, notwithstanding any excuse whatever, you be and personally appear at Hanner's Farm, in said city of Toledo, on Wednesday, August third, in the year of our Lord, A. D. 1904, at 8 o'clock P. M., then and there to witness whatever we shall elect to do unto you, the same being a respite from police, road and roadside trials and tribulations in the way of a dinner given under the auspices of Ye Toledo Automobile Club, by Ye Pope Motor Car Co. And this banquet you may nowise omit under penalty of having your rear tires slit, your gasoline watered, your batteries short-circuited, and what more we shall elect to do to you will be a plenty."

At the suggestion of Augustus Post early this week, it was decided by the Touring Committee to allow any of the tourists who desired to make the run from Toledo to South Bend, Ind., in one day to do so. It had been originally intended to have Thursday's run from Toledo to Waterloo, Ind., a distance of 93 miles, but it was found that the hotel accommodations were not sufficient at Waterloo to accommodate the whole party, and it was then suggested and decided that all tourists who desired to do so could make the run of 179 miles from Toledo to South Bend in one day. They will then remain in South Bend from Thursday night to Saturday morning, when they go on to Chicago. A large number of the tourists decided to avail themselves of this opportunity and got out before the sun was up on Thursday morning to start the run. Among these were James Waters, Panhard; George Lowe, Ray D. Lillibridge, Carl Paige, Augustus Post and George S. Waite in their White steamers; Harlan W. Whipple, Mercedes; Chas. J. Glidden, Napier, and Harry Esselstyn, Franklin. A number of others also promised to make the run, but the above named set out intent upon doing so.

Secretary Tucker, of the A. A. A., left early Thursday morning on the train for Waterloo. He went direct to Locke House and there accepted the signatures to the official register of all tourists who desired to go on to South Bend. M. L. Downs went by train to South Bend to receive the tourists at the official headquarters in the Hotel Oliver there. This run through to South Bend is the largest one-day run ever held in any automobile contest in America. The Toledo Club had prepared blue print road maps of the roads from Toledo to Ligonier and South Bend, and these were given to the drivers of each car.

Mr. Scott, who has charge of the Peerless special, rode to Toledo with Mr. Breese, allowing the others to bring his car along as best they might. The big car seems to have been hoodooed from the very start, and has had all sorts of troubles and bad luck. There have been all sorts of bets made as to whether the car will get to St. Louis or not.

Toledo to South Bend.

Shortly after midnight on Wednesday, Mr. Morrison, of Toledo, driving a Winton car, started for Waterloo and South Bend, scattering confetti to mark the routes. The greater part of the crowd decided to make the two days' run in one and rest over Friday at South Bend, starting for Chicago Saturday morning. Assistant Secretary A. B. Tucker, of the Touring Committee, with the special representative of the HORSELESS AGE, went to the Locke Hotel, Waterloo, Indiana, the noon stop. All the tourists were obliged to stop there and register their names on the official book.

The little town of Waterloo was alive to the occasion, and the population turned out en masse to greet the autoists. Flags were flung to the breezes and business was at a standstill. A baseball game was held in the afternoon between the Waterloo and Kendalville teams for the entertainment of the tourists, and it was promised that there would be a concert by the ladies' band of the village in the evening, but even this inducement was not sufficient to keep the majority of the tourists over night.

The roads between Toledo and Waterloo were in fair condition but horribly dusty. Enveloped in a grayish cloud of dust, driver and machine alike, James Waters reached Waterloo shortly after 10 o'clock, having made the run in his Panhard car in a little over four hours, a distance of 93 miles. He had some adjusting to do on the car, and his chauffeur attended to this while Mr. Waters ate his lunch. The other machines straggled in from time to time, and secured water, oil and gasoline. Most of the tourists stopped for dinner and registered on the official book, after which those who were to continue to South Bend started on the last stretch of the run. A number of tourists who had decided to remain at Waterloo, after seeing the official hotel, changed their minds and continued on to the Hotel Oliver at South Bend.

Word was received at Waterloo to the effect that Ray D. Lillibridge's White steamer, driver by Mr. Sonnanstine, had met with a breakdown near Bryan, Ind. It seems that the car's troubles had started ten miles east of that place when the engine frame broke. This was temporarily repaired with straps and the run continued. When near Bryan, the machine suddenly careened to one side of the road, a knuckle joint having broken, and let the front of the car down in the road. Luckily, the machine was going slowly at the time, and none of the passengers in the car was injured.

A man driving a horse happened by at the time of the accident and stopped to ask the cause of the trouble. It was decided that Mr. Hantak, a passenger in the machine, should go on to South Bend at once and get a new knuckle joint. The accident occurred half a mile from the nearest railroad station and the only train of the afternoon was due to pass in seven minutes. The man with the horse volunteered to take Hantak to the depot and lashing up his horse started on a gallop and made the train all right.

A new knuckle joint was taken out of the trunk of supplies shipped ahead each night for the White cars, and Hantak took a train from South Bend at 11 o'clock, due at Bryan at 2 a. m. The new knuckle joint will be put in place and the car will make the run through to South Bend before Friday night, in order to be on hand for the run to Chicago on Saturday morning.

The big Peerless car reached Toledo on Wednesday night and started late on Thursday for Waterloo. At last reports the car was tied up as a result of tire troubles.

The following cars arrived at South Bend on Thursday night, the others remaining at Waterloo:

Breese, Mercedes; Page, White; Johnston, Peerless; Post, White steamer; Glidden, Napier; Waite, White steamer; Birchwood, Haynes-Apperson; Lowe, White steamer; Jay, White steamer; Esselstyn, Franklin; Waters, Panhard; A. L. Pope, Pope-Toledo; MacLaughlin, Royal tourist; Collings, Peerless; Fetch, Packard; Huss, Oldsmobile.

GOOD ROAD NEAR THE NEW YORK-PENNSYLVANIA STATE LINE.

Several parties in machines drove in from the surrounding country to greet the tourists. One delegation had their cars labeled, "We come from Coldwater, Michigan, where there are only 6,000 people and forty automobiles."

The Yale car driven by Mr. Swinehart and fitted with solid tires re-joined the run at Toledo. It will be remembered that the Yale machine had its gears stripped on the run from Poughkeepsie, N. Y., to Albany, N. Y. The car was shipped by express to Toledo for repairs and started with the crowd on Thursday morning. The bad luck which seems to be following the car still continued, and when about thirty miles out of Toledo the machine skidded down into a deep gulley and overturned, throwing Mr. Swinehart and his passenger out. Both landed unhurt and picked themselves up as

soon as possible. Strange to say, they found the motor of their car still running despite its position, and it did not stop until the spark was switched off. A White steamer came along shortly after the accident occurred and helped right the car, after which it was found that the machine was not injured in the slightest and was able to pull out of the ditch and continue under its own power. This is the only machine on the run that is fitted with solid tires.

No. 9, the Peerless entry fitted with a Limousine body, attracted considerable attention, and drew forth the aw's and oh's of the country folk, who were duly impressed with its magnificence, and "reckoned some of them New York millionaires must own it." In reality the car was entered by Mr. Johnston, advertising manager for the Peerless.

Secretary Tucker received a dispatch from the Packard Motor Car Co. at Waterloo instructing him to enter Tom Fetch as a tourist from Erie, Pa., to St. Louis. Fetch had been running independently up to this time. Tom, when informed of the fact that he was officially entered, at once selected No. 13, as all the others in the run had fought shy of it. He believes that he will reach St. Louis despite the fact that he rides with the hoodoo number on his car.

En route to Waterloo, Webb Jay had a rather exciting experience. In starting suddenly, a strut rod broke and struck the gasoline feed pipe to the pilot light.

Mr. Waite, White, had tire troubles, as did Mr. Breese, Mercedes. Despite this the latter made the trip in three hours and fifty minutes, the fastest time made. The usual number of chickens were killed en route, and the late arrivals at Waterloo stated that the farmers had picked the dead fowl out of the roads and tied them to the fences, one man having labeled them with a sign reading "Road Hogs Killed These."

Mr. Glidden had a remarkably fine trip, finishing the 176 miles in less than eight hours without stopping either the motor or the car. F. C. Collings, Peerless, also finished in good shape after a long and steady run. There was no entertainment provided for the tourists at South Bend, and all of them, tired out by their long run, retired early.

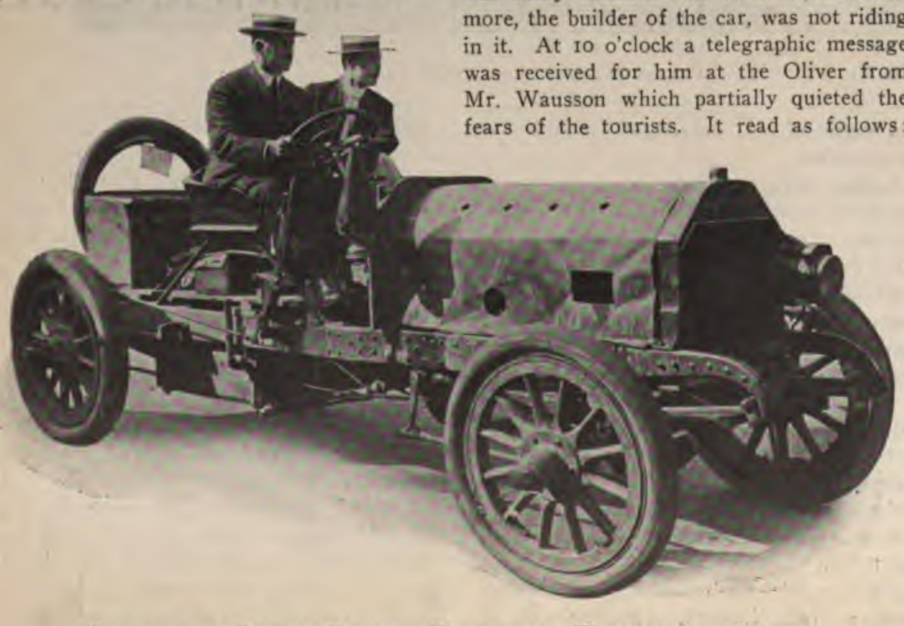
On the way to South Bend, and when near Osceola, on Friday morning, Harlan W. Whipple's Mercedes car was put out of the contest temporarily by spark troubles due to a defective magneto. Mr. Whipple left the car with his man, and came to South Bend by train, later returning with help to his machine. The magneto was finally repaired and the car reached South Bend late Friday night. The Buckmobile also pushed through to South Bend and Mr. Seaton was given a warm welcome.

COLLIDED WITH TRAIN.

There was consternation among the tourists at the Oliver on Friday morning when word was received that the big 70-h. p. special Peerless car, which has been running with bad luck since the first day out, had collided with a fast express train on the Cincinnati, Hamilton and Dayton road at Perrysburg, Ohio, and had been demolished. The first report had it that all the occupants had been either killed or badly hurt. Mr Glidden at once got into telephonic and telegraphic communication with Perrysburg, but the information he secured was meagre and unsatisfactory. It was stated that the car had mixed up things in some way with a train, but not stated what damage was done or whether any one had been badly hurt or not.

There were in the car at the time the accident occurred R. B. Wausson, of Baltimore; Gus Behrens, Baltimore; Charles Benner, of Cleveland, and Charles S. Scott, of Cadiz, Ohio. Behrens, it was stated, had been thrown against the train and severely bruised, while the other members of the party were unhurt, although the machine was badly wrecked. R. P. Scott, of Baltimore, the builder of the car, was not riding in it. At 10 o'clock a telegraphic message was received for him at the Oliver from Mr. Wausson which partially quieted the fears of the tourists. It read as follows: "Front end of car badly smashed by express train. Can be repaired. No one hurt.—R. B. Wausson."

It seems that the car came up a small hill to the railroad crossing, the approaching train being hidden from them. They tried to back down off the rails and got the greater part of the big car off the tracks when the crash came. The front wheels, radiator and springs were smashed, but the engine was not hurt. The car was drawn to the side of the road and left there. Gus Behrens was driving at the time the accident occurred, and he claimed that the noise of the car had drowned that of the approaching train. It was generally believed on Friday night that the car would give up the run and Mr. Scott would have it shipped back to the factory for repairs.



The 70-h. p. Special Peerless Which was Wrecked by a Train.

At South Bend.

Sixteen machines, dust-covered and travel-stained, were safely stored in the garage at South Bend, Ind., by 10 o'clock on Thursday night, and the remaining eighteen or nineteen cars that started from Toledo were strewn along the road between that place and South Bend. The official register at the Oliver showed the following cars had completed the run of 176 miles, the longest single day's trip in any tour or contest ever held in America:

Webb Jay, White; Birchwood, Haynes-Apperson; Esselstyn, Franklin; Waters, Panhard; Huss, Oldsmobile; Lowe, White; Paige, White; Johnston, Peerless; Post, White; Glidden, Napier; Waite, White; Breese, Mercedes; A. L. Pope, Pope-Toledo; MacLaughlin, Royal Tourist; Collings, Peerless; Tom Fetch, Packard.

The tourists who had finished the run spent the evening sitting around the corridors of the Oliver and talking over their trip. Mr. Waters' Panhard car had been delayed by the metal dustpan under the body striking an obstruction in the road. The pan bent up so that it interfered with the fly wheel, and had to be taken off and straightened before the car could go on.

It was learned at South Bend that J. W. Seaton, Buckmobile, had met with a peculiar accident when near Toledo that had put his car temporarily out of the run. While driving along at a fair rate of speed, the car ran over an iron hoople lying in the road. This was turned up by the wheels with sufficient force to throw it into the machinery, which is exposed on this car. The hoople landed in the water pump gears, ripping them to pieces. Mr. Seaton managed to get the car into Toledo by running the engine until it heated up and then stopping and waiting for it to cool down again before going on, a tiresome and tedious method. At Toledo he wired his factory at Utica, N. Y., to send new gears by special messenger. These arrived on Thursday and were put in the car. Mr. Seaton made a late start and will rejoin the tour at Chicago, or, if possible, at South Bend.

9 o'clock on Wednesday morning the :ylinder Winton, driven by Mr. Dyer, South Bend, having completed the from Waterloo. F. M. Manross and were next in with their big Columbia The others straggled along from rloo at irregular intervals. They re- d a very pleasant stay at the Locke e, where they were serenaded in the ng by the ladies' band of that enter- ig town.

yor Edward J. Fogarty, of South , following the example of the other executives in the cities along the line e tour, wrote a letter to be taken to r Wells of St. Louis.

e local automobilists have just formed club, but were not in a position to en- n the tourists. The Studebaker Auto ame to the front, however, and invited ourists to attend an informal smoker held at the Indiana Club at 8.30 P. M. mber of the tourists availed themselves e invitation. There was the usual d of good things, followed by compli- ary oratory.

CHICAGO ESCORTS ARRIVE.

9 o'clock Friday morning three ma- s carrying a party headed by Robert pangler, assistant secretary of the Chi- A. C., arrived at South Bend. They been driving since midnight and re- d the roads in good condition. Mr. gler, in behalf of the club and the nobilists of Chicago, extended a wel- to the tourists, and announced that a party would come to South Bend in cars to escort them into Chicago. Mr. gler handed everyone of the tourists streamers of purple and gold ribbon, Chicago A. C. colors, and requested that wear them while in the Windy City.

e Chicago people intend to do the noble and will entertain the tourists royally. Friday morning a large number of the members assembled at the clubhouse in ago at 10 A. M. and started on the 105- run to South Bend, arriving late in afternoon. There were about twenty ines in all, each carrying a full comple- of passengers and decorated with the colors. These announced that quite a ber of machines would meet the party Hammond on Saturday morning, and over one hundred cars would make a nphal entry into the city. President pple, of the A. A. A., received the fol- ng telegram from President Farson, of Chicago A. C., at the Oliver Thursday t: "You will receive a hearty welcome hicago, and we will make special effort art you out for St. Louis in first-class ition."

e following owners of machines made run from Chicago to South Bend on ay, each having a party with him: John on, F. C. Donald, Sidney S. Gorham, G. Floyd, I. V. Edgerton, A. C. Banker, R. Mason, H. J. Ullman, Orlando F. er, Dr. J. B. Weintraub, C. H. Foley, Dr. F. C. Greene, Allen S. Ray, J. M. Hayden, William McMunn, B. G. Sykes, Robert Tarrant, Jr., H. C. Adams, John E. Fry, Dr. E. H. Pratt, F. Cecil Davis and wife, Mrs. Caroline Vaugh, of New Orleans, and Miss Caroline Lispcomb, of Denver.

EARLY STARTERS FROM ERIE.

The Chicago Club had prepared road maps, giving the route from South Bend to Chicago, which were handed out to the tourists. These also contained explicit road directions. It was arranged to have photographs of each car and its occupants taken at the clubhouse in Chicago. These pictures are to be bound in an album to be kept at the clubhouse and preserved in after years to show the cars and people who participated in the great overland run.

A number of the tourists are getting advertising out of their cars by labeling them with various signs as well as the A. A. A. banner. The Elmore bears the information that it is making its second trip to St. Louis. Chas. J. Glidden has on his Napier the sign "Arctic Circle to St. Louis." The Covert motorette is fitly styled "The Baby" in large black letters, and Percy Pierce on his car has the sign "Mount Washington to St. Louis."

The further west the tourists go the greater is the enthusiasm met with in the cities. The demeanor of the farmers en route is not as friendly as in the East, however. W. A. Copeland, the A. A. A. committeeman at Pontiac, Ill., has written that the City Council there has decided to give the tourists the freedom of the city and will provide entertainment for them, making the afternoon and evening of their arrival a gala event. The Vermillion Club of that city will throw open their club baths to the tourists, a comfort that will, without doubt, be greatly appreciated.

Col. R. D. Lowe, of Springfield, Ill., the last night stop before St. Louis, has sent word to the tour committee to the effect that the farmers in that section are all ready to welcome the autoists, and have been busily engaged in fixing up the worst places in the roads, and will rush them into as good shape as possible before the tourists pass over them.

There was much activity at the garage at South Bend Friday morning. The White steamers of Lowe, Post, Waite and Jay all had to have either new rear springs or the old ones strengthened. Sonnanstine arrived about noon from Bryan, where he had been tied up all night, a knuckle joint having broken and let the car down in the road. A special messenger was sent from South Bend on the 11 P. M. train Thursday night and reached Bryan at 2 A. M. Friday morning with the new knuckle joint. This was put in place and the car continued on its way to South Bend. After arriving at the garage the mechanics of the party got to work to take out the engine frame, which had broken a considerable distance out of Toledo and had been temporarily patched up with straps.

The Franklin car had the cylinders taken off and cleaned. They, like many others on the run, had purchased cylinder oil en route, and this proved to be of uniformly poor quality. It gummed up the piston rings and carbonized on the piston heads and in the explosion chambers. All who used the stuff had troble, and Mr. Esselstyn thought that the best way out of the difficulty was to have the engine cleaned up.

There was some little discussion around the Oliver over the fact that Tom Fetch had taken No. 13 for his car. Every one but Fetch had steered clear of the hoodoo number, but as soon as he selected it some of the manufacturers raised a howl, maintaining that as Fetch was a late entrant, he was not entitled to have so early a number. The matter caused so much discussion that it was finally referred to the Touring Committee, who decided that Fetch should keep the number. Tom then marched down to

the garage and there selected a cross-eyed mechanic to help him. An umbrella was raised over their heads and at thirteen minutes past two on Friday afternoon the numbers were tacked on the car. Fetch believes this combination of hoodoos will bring him luck.

James Breese, in his Mercedes car, decided to go to Chicago on Friday morning. He was informed by Secretary Tucker that under the rules of the tour he would lose his certificate at St. Louis if he took his machine out of South Bend before Saturday morning. Mr. Breese replied that he would rather lose the certificate than to postpone his trip, and early Friday morning he started for Chicago, promising to join the crowd there on Saturday.

Mr. Waters was also called to Chicago, but not wanting to jeopardize his chances of getting a certificate he left his car and went on by train. His chauffeur will drive the machine into Chicago on Saturday.

ST. LOUIS PARADE POSTPONED.

It was announced at the Oliver on Friday that after a conference with the managers of the World's Fair it had been decided to postpone the auto parade of the tourists through the Fair Grounds until Friday, Aug. 12. It had been originally planned to have the tourists reach St. Louis on Aug. 10. waiting at East St. Louis for the party coming over the National Highway and for the escort of St. Louis automobilists, and on Aug. 11, St. Louis Day, to have the tourists parade through the Fair Grounds. The managers of the Exposition decided, however, that these two events would be too much for one day, and set down Friday, Aug. 12, as Automobile Day, and the parade will be held then. The tourists will reach St. Louis on the 10th. as planned, however, and will be entertained by the St. Louis automobilists. The greater number in the party will remain in St. Louis for a week or ten days. Some of them will drive their cars home over the National Highway, while others will ship the machines by train.

After the arrival of Chairman Mudd, of the Chicago division, a conference of the Touring Committee was held at the Oliver, and it was decided that 7.30 A. M. would be set as the official time for the cars to leave South Bend on Saturday morning. The noon stop was scheduled for Valparaiso, and it was requested that all the tourists stop a half hour there.

It was officially announced that controls would be established outside Chicago. A green flag would mean to slow down and a red one to stop entirely. The day's run is to end at the German Building, Jackson Park, where the tourists will be met by the members of the Chicago A. C. and escorted through the streets of the city to the club headquarters, where they are to be the guests of honor.

The arrival of the tourists has been well advertised in Chicago, and thousands of people are expected to turn out to greet them. The Touring Committee decided to squelch the racing craze, and gave notice that any of the cars failing to wait in Jackson Park for the escort and the parade would be disqualified and receive no certificate at St. Louis. Grumblings were loud among the drivers of the high-powered cars at this announcement, as they had planned a grand race in Chicago and a scoop on all the free newspaper advertising as first in.

While driving toward South Bend, Sonnanstine, White, had a rather odd experience with a runaway team of horses. The team took fright at the machine and dashed down the street just as the farmer owning them came rushing out of his house. Sonnanstine, taking in the situation at a glance, called to the farmer to jump into the auto, which he did, and the machine then started after the frightened animals. After a quarter of a mile chase, the horses were caught up with and passed. The auto then blocked the road, which was a narrow one, and began to slacken pace, and the farmer was able to jump out of the auto and catch them. He thanked Sonnanstine for his kindness and started back home with his team, expressing the opinion that autos were not such bad contrivances after all. [This overtaking a runaway team on a narrow road rather taxes a man's credulity.—Ed.]

Mr. Oliver, the millionaire owner of the Oliver Hotel, visited the official headquarters on Friday night and was introduced to members of the tour. He had ordered a special menu to be printed for Friday evening's supper containing the names of the officers and the Touring Committee of the A. A. A. and it proved to be a pretty souvenir.

Friday evening the proprietor of a place called the Casino, about two miles out of South Bend, sent in a carte blanche invitation to the tourists to attend the performance there absolutely free of charge. This kind invitation was not accepted, however, most of the tourists attending the smoker given by the Studebaker Co. at the Indiana Club. Mr. Studebaker, president of the company, was on hand and was introduced to the tourists. The evening was pleasantly spent, buffet refreshments being served, but the party broke up at an early hour, as all desired to go to bed and rest up for the 105-mile run to Chicago, ending the second week of the big tour and bringing the machines about 1,100 miles out of New York city in twelve days' running.

Frank X. Mudd, chairman of the Chicago division of the tour, had arranged to have a car carrying confetti leave South Bend before 6 A. M., the regular starters leaving at 7.30 A. M. Mr. Mudd had rigged up a three-inch metal tube from the tonneau of the machine to within eight inches of the ground, ending in a funnel at the top through which the men in the cars dropped an ounce of chopped paper on the route every 300 yards, except at turns, where one ounce was dropped every 100 yards. It was claimed that paper placed in this way will not blow around and confuse the tourists, as that thrown by hand had done.

Despite the fact that the Touring Committee had posted a notice to the effect that the tourists could not enter Chicago, but must stop and wait at the control arranged in Jefferson Park for the escort into Chicago, and to let the late starters catch up, some were off at 6 o'clock. James Waters' Panhard was among the very early starters. By 7.30 o'clock most of the participants were under way.

Mr. Scott's special Peerless is out of the run for good, having been shipped back to the factory after its run in with an express train. Mr. Wausson, who was at the Oliver on Saturday morning, in speaking about the accident to a Horseless Age man, said that the party had been up all night running on from Toledo to make up lost time. He was asleep in the car when he was suddenly awakened by the brakes being applied quickly. The crash with the train followed a second later. Mr. Wausson believed that the driver was dozing and so ran upon the tracks before he knew that a train was coming. He was glad that the accident terminated so fortunately, and had no blame for any one in particular. The crash with the train resulted in the smashing of the front wheels and springs. The radiator was broken, as was the engine frame. The engine itself was unhurt.

Mr. Keely, driving one of the Rambler cars, met with an accident outside of South Bend, breaking a crank shaft. He sent in word that he had arranged to have repairs made and would join the crowd in Chicago before the start on Monday morning.

South Bend to Chicago.

There was more fuming and fussing at the start Saturday morning from the Oliver at South Bend than there had been at any place since the run started. The decision of the committee to have the tourists start at 7.30 A. M., spend a half hour at lunch at Valparaiso, and not finish at the German Building, Jackson Park, Chicago, until 3 P. M., put the drivers of the big cars under a restraint that they found it hard to get along with. Having been in the habit of starting off at sunrise and rushing through at break-neck speed in order to be first in, they chafed under the delay, and all sorts of uncomplimentary remarks were heard regarding the committee's ruling. From force of habit, the operators of the big cars had their machines lined up outside the Oliver as early as five o'clock.

The Chicago contingent who had come over the road reported that deep sand would be met with for twenty miles or more before Valparaiso was reached. This frightened some of the drivers who had been carrying passengers with them, so they decided to ride light for that stage, and the passengers were consequently asked to

iain behind. This increased the party reling by train considerably.

t was decided by the Touring Committee t Dr. Milton B. Pine of Chicago should l the cars out of South Bend and to-d the Windy City. The tourists started r the good physician, but were not out the city before many started in to speed, Dr. Pine was soon leading the rear rd. Forty-nine machines made the start n South Bend, thirty-three regular en-s, and sixteen machines that had come from Chicago.

he Chicago escort cars on their way to th Bend experienced considerable tire ible. President John Farson was de-d by a blow-out. One of the Knox had nine punctures. It seems that a ll nail had entered the shoe, and each e an inner tube was put in it was punc-d. Four spare tubes were inserted and ctured, and five others repaired and put before the nail was finally found and n out. The car was delayed some rs by this rather remarkable lot of ible.

MISHAPS AND ACCIDENTS.

he run from South Bend to Chicago one of mishaps and accidents. Three hines were ditched and overturned, and e were two runaway accidents to mar day's trip; all of which, singularly ugh, happened near La Porte, Ind.

he first accident happened to a Winton ring car owned by Mr. Meyers, a mem-of the Chicago A. C. Mr. Meyers was ing along near La Porte, and in taking urn at a high rate of speed his car lded in the sand, plunged into a ditch turned over. Mr. Meyers and his pas-ger were thrown out, but escaped with ht bruises.

leyers it seems was trying to establish peed record between South Bend and cago. Mr. Spangler, secretary of the cago A. C., happened along with a party car a short time after the accident oc-red. After taking a snap shot of the hine lying upside down in a gully, set to work and helped to right it in, a number of farmers who had gath-l assisting them.

he second accident was a much more ous one, and happened to a Cadillac car en by R. A. Kent of the Chicago club, had Roy W. Sturtevant with him as assenger. Mr. Kent made the run to th Bend on Tuesday, to escort the tour-back to Chicago. He was traveling n a steep hill in rather deep sand, about miles out of La Porte, when suddenly car skidded, became unmanageable and, ing suddenly at right angles to its rse, plunged into a deep ditch and over-ed.

ow the men escaped instant death is aculous. As it was, Kent's left wrist broken and he was badly bruised, and tevant was injured in the back, but not usly. Both men might have jumped, but Kent believed that he could manage the car, and stuck to his place in it. The automobile in taking the ditch turned a complete somersault, throwing Kent far out on the ground and burying Sturtevant underneath. Farmers who had witnessed the accident hurried to the scene and, lifting the machine, picked Sturtevant out. Kent was unconscious. Both men were taken to a nearby residence, where their injuries were dressed, and later they continued to Chicago by train. The auto, badly smashed, was towed into La Porte and left there.

Accident No. 3 happened to car No. 35, the White steamer entered by Dr. W. H. Gifford, of Cleveland, Ohio, who had with him as passengers George Johns and John Cudmore. Dr. Gifford was driving along at about a twenty mile an hour gait when his car also skidded and ran off the road, heading for a gully. The doctor realized that it was impossible to avoid an accident and shouted to Johns and Cudmore to jump, at the same time rising to jump himself.

Johns got off the car at the moment it turned over. Dr. Gifford was thrown clear of the machine and landed fifteen feet away, as did Cudmore. The car turned upside down completely, all four wheels being up in the air.

Dr. Gifford luckily did not lose his nerve, and the second he recovered from the shock he jumped to his feet, rushed to the machine, and shut off the gasoline supply and extinguished the fire, thus preventing any trouble from this source. He received assistance and righted the car and then found that the steering connections and steering wheel were bent. These were straightened with some difficulty and the car was able to continue the run to Chicago, arriving at a late hour on Saturday afternoon. Dr. Gifford on telling of the accident said that his escape from serious injury if not death had been miraculous, and he thoroughly appreciated his good luck in escaping as easily as he did.

Two horses were frightened by the cars and ran away. A woman was injured in one of the accidents and was taken in Harold Pope's car two miles to La Porte for medical attention.

The various railroads leading into Chicago were crossed forty times by the tourists and there were several narrow escapes from collisions with trains.

At Chicago.

It was ten o'clock Saturday morning when Mr. Downs, of the committee, THE HORSELESS AGE representative and the rest of the crowd traveling by train reached Chicago. The party at once went to the official headquarters at the Auditorium Annex and from there to the Chicago A. C. headquarters. Mr. Downs had secured red and green flags to mark the controls established outside the city where the autos were to gather and wait for the crowd of Chicago people who were to escort them into the city. It was necessary to secure an auto to go out to Jackson Park to place the flags near the old German Building of World's Fair fame.

Charles Howard Tucker, of the Winton Company, placed his car, a new 1905 quad, at Mr. Downs' disposal and drove him, THE HORSELESS AGE man and two tire representatives out to the appointed place of meeting. It was nearly one o'clock when the German Building was reached

THE ELMORE PATHFINDER AT CLEVELAND.

and a half dozen or more cars were in waiting there for the crowd to arrive.

The run from South Bend had been a race as usual and all the big cars were in. Tom Fetch, Packard, had made the run of 110 miles in 3 hours and 50 minutes carrying four people. The Pope-Toledo also made a very fast run, as did Mr. Glidden in his Napier. Owing to a misunderstanding, no confetti arrived at South Bend and consequently the roads could not be marked, despite the elaborate preparations made by Mr. Mudd. As a result of this, the cars got off the road several times and were delayed.

Mr. Downs with his control flags was laughed at for getting around so late. A number of the tourists had lunch at the German Building and then took their seats on the steps to await the arrival of the slower cars, meantime admiring the beauties of Lake Michigan, which lay before them.

FUSS OVER PARADING ORDER.

Mr. Waters' Panhard car missed the control and drove into the city ahead of the crowd. The White steamers and some of the other cars were late in arriving, it being almost four o'clock before Augustus Post gave the signal for the start. There had been a petty war in discussion about the order in which the cars were to enter Chicago. A. L. Pope was particularly insistent upon having the cars enter the city in the order they had reached Jackson Park. Mr. Glidden took exception to this, maintaining that the cars ought to go through the city in the order of their entry numbers. He stated that Mr. Farson, president of the Chicago A. C., should be allowed to head the procession through the city.

The argument waxed warm and for a time it looked as if there might be a split and a demoralization of the whole run. Mr. Glidden said that if the manufacturers entered intended to turn the tour into a race, he would give them all of that game they wanted and start Sunday morning for St. Louis to make the distance without a stop and give up his certificate.

A hurried session of the members of the Tour Committee was held and it was decided to let the cars enter the city in numerical order.

Over 150 Chicago cars were on hand to act as escorts when the procession started. Other machines joined en route in the run down to the Auditorium Annex in front of which over 200 cars passed in review. The streets were crowded with people out to see the machines, and the tourists were given an ovation. The Chicago Athletic clubhouse was decorated with American flags. The streamers of purple and yellow worn by the tourists entitled them to the privileges of the clubhouse while in the city. It had been arranged to serve table d'hôte dinners to the tourists at the club at reasonable rates. An orchestra was on hand during the afternoon and evening and open house was kept, buffet refreshments being served.

A telegram was received at Chicago on Saturday night from Indianapolis reading as follows:

"Twelve of the automobilists en route to St. Louis from Eastern cities by the southern road arrived here to-day. They will leave for St. Louis on Monday. The first car to arrive was driven by Samuel Stone, Jr., of New Orleans. With him was Palmer Abbott, of the same city. While running through this city the car struck Mrs. Margaret Alfont, knocking her down and breaking her arm in two places. It is expected that ten or more cars will start from here on Monday morning."

There was considerable repair work done in the various garages on Saturday, most of the operators cleaning and adjusting their cars in order to have Sunday to themselves. A bent front axle on the Yale car was straightened. A number of the chain driven cars had to have links taken out of the chains, they having stretched in the hard pull over the sandy roads. The Franklin car had its first puncture since leaving New York, picking up a nail in a rear tire in front of the Buffalo A. C. headquarters.

Mr. Lillibridge, White, was so ill that a physician advised his immediate return to New York. He left on a night train, and Mr. Sonnanstine will put the car through to St. Louis.

E. H. Wallace and wife, in their Rambler car had not been heard from since leaving Toledo and an unsuccessful effort was made on Sunday to locate them by telegraph.

Sunday afternoon some of the tourists driving their own cars and others riding in the machines of members of the Chicago A. C. were taken on a sight-seeing trip around the city and along the Lake Shore drive and the Sheridan boulevard. A sacred concert in their honor was given at the Country Club, formerly the Evanston Boat Club, where dinner was served. The HORSELESS AGE representative and a party of tourists were the guests of W. R. Mason, of 1466 Michigan avenue, in a speedy Austin car.

It was decided by the Touring Committee on Sunday to have A. L. Tucker go direct from Chicago to St. Louis to complete arrangements there. A set of rules were also drafted controlling the finish at East St. Louis, where the National Highway party will be met. A control will be established where the tourists will have to await the arrival of the St. Louis cars. At St. Louis the machines will be stored with the agents of each particular make. The tourists will be entertained at the Buckingham Club and at the Anheuser-Busch brewery.

It is specifically stated that in order to get an official certificate each car will have to participate in the parade through the Fair Grounds, at the termination of which the letters from the Governors and Mayors of cities passed through will be handed to President Francis.

Chicago to Pontiac.

Monday dawned bright and clear, although there had been a great change in the weather, the thermometer having dropped considerably. The tourists were all up early, and at 6:30 the confetti car started out to mark the roads, precluding the possibility of the tourists being lost, as many were coming from South Bend to Chicago. None of the party attempted to start out before the confetti car, but many left shortly after it.

L. A. Wood and R. B. Ledy, of St. Paul, were among the tourists who reached Chicago on Sunday and started out Monday morning. E. F. Jackson and W. H. Stepauch, of Cedar Rapids, Iowa, jogged into Michigan avenue Sunday afternoon and drew up in front of the local clubhouse after a trip of 200 miles. George J. Sherer and S. J. Turnblad, of Minneapolis, also arrived, as did C. B. Judd, of Grand Rapids, all of whom were among Monday's starters.

Following is a list of the starters from Chicago: Harlan W. Whipple, Mercedes; John Farson, Apperson; C. H. Gillette, Pope-Hartford; Carl H. Paige, White; R. H. Johnston, Peerless; Augustus Post, White; F. X. Mudd, Austin; W. C. Temple, Pierce Great Arrow; Tom Fetch, Packard; C. J. Glidden, Napier; George S. Waite, White; J. L. Breese, Mercedes; F. C. Donald, Pope-Toledo; H. Frederick Lesh, Pope-Toledo; C. H. Birchwood, Haynes-Apperson; George H. Lowe, White; W. E. Sonnanstine, White; Webb Jay, White; Percy F. Megargel, Elmore; Dr. W. H. Gifford, White; W. B. Hurlburt, Cadillac; F. M. Manross, Columbia; H. C. Esselstyn, Franklin; J. M. Waters, Panhard; P. P. Pierce, Pierce Great Arrow; F. Ed. Spooner, Oldmobile tonneau; F. C. Gates, Winton; H. L. Pope, Pope-Hartford; B. C. Swinehart, Yale; A. L. Pope, Pope-Toledo; A. J. Seaton, Buckmobile; A. D. McLaughlin, Royal Tourist; H. J. Ullman, White; Sydney D. Gorham, Winton; Harold Hoag, Covert; W. G. Lloyd, Peerless; I. V. Edgerton, Stearns; Jerome A. Ellis, Apperson; Swan J. Turnblad, Knox; Charles B. Judd, Austin; J. H. Pietsch, Autocar; W. W. Shaw, Pope-Toledo; George J. Sherer, Knox; Marcon Motor Car Co., Marcon; L. A. Wood, Winton; B. A. Ledy, Rambler; T. E. Ellison, Pope-Toledo; W. J. Wilkins, Oldsmobile tonneau; W. R. Smith, Pope-Toledo; Orlando F. Weber, Pope-Toledo; Dr. H. C. Wender, Pope-Toledo; J. R. Blakeslee, Winton; T. C. Collings, Peerless; Ralph Temple, Franklin; B. G. Sykes, Locomobile; Dr. E. H. Pratt, Winton; Dr. D. D. Richardson, Glide; Arthur G. Bennett, Premier; E. R. Hibbard, ———; F.

J. Pardee, Packard; F. Cecil Davis, Special; George A. Crane, Knox; F. A. Benson, Oldsmobile tonneau; L. E. Meyers, Columbia; E. T. Jackson, Rambler.

Joliet, Ill., was the noon stop, but most of the machines will push direct through to Pontiac, Ill., a distance of slightly over 100 miles. The roads were reported in good condition, with slight stretches of sand. Cars 78 and 79, a Winton and a Rambler, from St. Paul, Minn., reached Chicago on Sunday, as did a machine from Grand Rapids, Mich., and another from Cedar Rapids, Mich., and these were ready to start with the crowd on Monday morning.

START FROM TOLEDO.

A large crowd gathered outside the Auditorium annex to see the machines off on the last stages of the big trip to St. Louis. All the cars entered from Chicago—and there were over twenty-five of them—carried large parties, among which there were many ladies. As these cars will have to go less than three hundred and fifty miles to the Fair Grounds, there was no hesitation in piling heavy loads into them.

M. L. Downs saw the tourists off and then started for Pontiac by train. The citizens of that town have arranged to give the tourists a warm welcome. The city park will be decorated and a band concert held there. The hotel accommodations being insufficient, the leading families of the town will throw open their houses and take in the men and women on the trip.

AT WOODVILLE, OHIO.

At Pontiac.

(Special Telegram.)

Early Tuesday, shortly after midnight, a careless mechanic working under F. A. Benson's Olds tonneau with a lamp opened the drip cock on the carburetor and the car caught fire. He fled from the place shouting "Fire!" The whole car was on fire in a moment. An alarm was turned in, but before the department arrived Tom Fetch, followed by W. S. Whitlock, of the G. & J. Tire Co.; J. Harry Sheldon, of the B. F. Goodrich Co.; Harlan W. Whipple; W. L. Beek, of the Chicago *Tribune*, and R. L. McCrea, of the Diamond Rubber Co., rushed from the Phœnix Hotel and smashed in the door of the garage adjoining that in which the fire raged. Fetch's Packard was pushed out, as were Esselstyn's Franklin and Seaton's Buckmobile, and all rolled to safety. The gasoline tank on the Olds exploded and the fire assumed threatening proportions. Most of the cars were in an open garage, and their owners rushed out in all sorts of *dishabille* and ran them to places of safety. Even one in the Phœnix Hotel was aroused and got out of the place. The greatest confusion prevailed. The fire was extinguished in short order by the department. The Olds tonneau was totally wrecked, but none of the others was damaged, although they were within a hundred feet of the blaze.

Mr. Benson entered his car in the tour at Chicago. He carried with him Mrs. Benson, Frank Benson, H. S. Hoffer and Irving Bets. This is the second car belonging to him that has been damaged by fire this season. He will sue W. A. Copeland, the garage man.

Several of the tourists, including James Waters in his Panhard, left at one o'clock for Springfield, Ill., deciding not to stay in Pontiac until morning. Cars valued at $150,000 and 1,000 gallons of gasoline were stored within 150 feet of the scene of the fire. The efficient work of the firemen saved these from damage. A subscription, headed by Charles J. Glidden, of Boston, was made up at the hotel and a neat sum of money contributed and presented to the firemen in recognition of their services.

The division going by way of the National highway started from Baltimore on July 29. They were started by C. Warner Stork, of the Maryland Automobile Club, from the Altamont Hotel at 9:15 A. M. The party included Samuel Stone, Jr., H. D. Newman, Frank Ziegler, and Palmer Abbott, of New Orleans, and Roy Collins, of Norfolk, Va. There has been a light rain the day previous, which laid the dust, but it was reported that in the western part of the State heavy rains had fallen, and the roads would probably be in very poor condition. The tourists were escorted out of the city by a number of local automobilists, and arrived at Frederick, Md., at noon, where they took dinner at the City Hotel, and after resting a while, continued to Hagerstown, Md., the first night stop.

W. B. Sanders and J. J. Loughney, of Philadelphia, lost three hours in making repairs in Winton. Hart P. Newman, Samuel Stone, Jr., Frank M. Ziegler and Palmer Abbott, all of New Orleans, and Mrs. J. M., W. B. and R. M. Hustead, of Uniontown, Pa., in three White steamers, were in early.

MINOR MENTION

Automobile races are to be held at Hamline track near Minneapolis on Aug. 17 and 18.

We are informed that eighty-seven Oldsmobiles have been sold in Paris so far this year.

It is rumored that a banked automobile race track may soon be built in Syracuse, N. Y.

A Toledo (Ohio) evangelist proposes to make use of an automobile "gospel wagon" in a tour of the world.

Building permits have been granted to the Commercial Motor Vehicle Co. for a $15,000 factory in Detroit, Mich.

The Reeves Pulley Co., of Columbus, Ohio, will soon place on the market a light touring car with air-cooled motor.

Arthur Visick, formerly of the Napier Co., of England, has been appointed representative for the Packard Motor Car Co. at St. Louis.

The directors of the Alexandria (Ky.) Pike Co. have placed a prohibitive toll of one cent per mile per horsepower on automobiles using the turnpike.

Percy Adams, of Springdale, Pa., recently towed a hand fire engine and hose cart behind his car from New Kensington to a serious fire in Springdale.

A Flushing, N. Y., policeman recently pressed a passing automobile into service for the purpose of capturing a supposed murderer. The man was caught.

Automobile enthusiasts of Salt Lake City recently held a successful carnival, the programme including an illuminated parade of decorated cars and a six-event race meet.

H. J. Willard, the Portland (Me.) automobile dealer, has moved into a new brick garage within the past few days. It is said to be well located and specially built to meet his requirements.

L. L. Whitman, who made a trip across the Continent in an Oldsmobile runabout last summer, is going to try it over again in a Franklin car. He started from San Francisco on August 1.

It is reported that the Standard Automobile Co. of New York has purchased a large plot of land in Long Island City, L. I., on which it proposes to erect an automobile factory or repair works.

W. E. Eldridge, manager of the Boston branch of the Pope Manufacturing Co., has tendered his resignation to take effect September 1. He will be succeeded by W. J. Foss, now of the Providence branch.

President Underwood, of the Erie Railroad, it is reported, has recently conducted a series of experiments with a view to adopting a large touring car, by fitting flanged wheels, for use in making trips along the road.

Dr. and Mrs. F. L. Sweaney, of Philadelphia, while on a recent automobile tour, visited Boise City and Idaho City, Idaho. The local papers state that Dr. Sweaney is the first to pilot a car over the mountainous roads in that section.

The Acme Motor Car Co., of Reading, Pa., recently gave their employees an automobile outing. They were conveyed to a picnic ground in cars belonging to the company, and when there indulged in athletic games and the other things which go with such events.

Thomas B. Jeffery & Co., of Kenosha, Wis., have organized a photographic competition, the rules of which provide that each picture must contain a 1904 model Rambler. Awards will be made according to merit in the following particulars: Artistic surroundings and pose, thoroughness of detail and availability for reproduction. Prizes of from $4 to $10 are offered.

J. A. & C. A. Xardell, of Utica, N. Y., have just put on the market a carburetor especially designed for high-speed motors. The mixing chamber is surrounded by a jacket through which is circulated hot water or air, and it is claimed that by this arrangement the carburetor will deliver a perfectly vaporized mixture at all temperatures and at engine speeds up to 6,000 r. p. m.

The National Battery Co. has withdrawn from the American Bicycle Combination and will hereafter conduct its business independently. The general offices and factory are to be located in Buffalo and the company will engage in the manufacture of storage batteries for power stations, automobiles and ignition work. R. L. Coleman is president and James MacNaughton, vice-president.

A 1,000 Mile Non-Stop Run Record.

We are informed that Chas. Schmidt, driving a Standard Model L Packard car, made a successful 1,000-mile non-stop run on Aug. 6-7. The exact time consumed was 29 hours 53 minutes and 37 2-5 seconds, which is an average of approximately thirty-three miles an hour. The motor did not stop at all, and the car stopped only once when it became necessary to replace a tire.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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The Conclusion of the St. Louis Tour.

Like the endurance contest to Pittsburg last Fall, the tour to St. Louis has proven a conclusive demonstration of the reliability of American built road cars, and it can now be said with assurance that any owner of an up-to-date car of any of the makes represented in the run, need have no hesitation in venturing on a long tour over the poor roads abounding in this country, and may confidently expect to keep up to a 100 mile a day schedule without racing and without inconveniencing himself. The St. Louis run was favored with better weather and did not include such difficult stages as that between Pine Hill and Binghamton, for instance, but the aggregate showing of the cars was so much better than in the earlier one, that it is not difficult to discern a general improvement. Practically every car that started from Boston and New York with the intention of making the complete trip to the World's Fair City, arrived at the appointed date and made the controls every evening during the run. While the performance is practically alike for all the cars, it is particularly creditable in the case of the vehicles of low power and low selling price. All the more popular makes of big touring cars are well known to be quite equal to a trip like that from New York to St. Louis, but this cannot be said of all cars selling at in the neighborhood of $1,000 or less, so that the cars of this kind which successfully made the tour, may well be considered to have proven themselves among the best of their class.

It is a pity that the only car with solid tires in the tour met with a mechanical accident which obliged it to cut out nearly one-half of the trip. Yet, the showing made by the car during the rest of the run was sufficient to demonstrate the practicability of solid tires for touring cars (of certain makes at least). The accident, which befell the car early in the run, was of such a nature that it would be absolutely impossible to trace it to the tires. It is, of course, obvious that solid tires must be somewhat harder on the frame and mechanism of a car than the more resilient pneumatics, and had the mishap been the breaking of some supporting part, say the engine or gear case, one might have been inclined to hold the tires responsible. There were no troubles of this kind, however, and the tires apparently caused no delay whatever.

We have now had one of the regulationless, "go-as-you-please-jaunts," for which some members of the trade have been clamoring since the New York-Boston endurance run in 1902, as well as the regular endurance contests with official observers, and the industry will in the early future have to choose between these two kinds of demonstrations for next year. We do not believe that the go-as-you-please run has proved as enjoyable an affair as was expected, and the attempt to eliminate the spirit of competition has, of course, utterly failed, as it was bound to. The competitive spirit will always prevail in these runs, and it would seem to require strict regulations to check it and prevent the unscrupulous from taking undue privileges. One thing is certain, and that is that impromptu road racing is not calculated to make any converts to the automobile movement, nor to improve the legislative situation. There can therefore be no question of competing on the basis of speed. It would seem to us that improvement in the machines from year to year would call for constantly greater refinements in the contest conditions, and the more minute observations of every detail in the behavior of the cars.

In at least one instance has the St. Louis Tour been the direct cause of re-

strictive local speed regulation. As reported in our last issue, a series of accidents happened in the vicinity of Laporte, Ind., to members of the tour and to automobilists of Chicago on their way to South Bend to act as escorts. The cause of the accidents was in every case high speed, and one of the drivers who met disaster was trying for a speed record. This was on Friday before last. On Saturday some of the big machines en route to Chicago raced through the town at great speed. On Monday of last week the City Council of Laporte met and declared an emergency, and under suspension of rules passed an ordinance prohibiting automobiles from going faster than eight miles an hour through the city, and fixing a fine of $100 for violation of the ordinance.

Increase in Price of Tires.

Although there has been as yet no announcement to the trade to that effect, it is practically certain that there will be a general increase in the price of pneumatic tires by September 1. Crude rubber now stands at $1.18 per lb., and certain improvements in the processes of manufacture which have been found necessary, have so increased the cost of manufacture that the tire makers think they are fully justified in making a slight advance in prices. It is confidently believed, however, that the improvement in manufacturing methods contemplated will result in goods of greater reliability and better wearing qualities, and that although the consumer will have to pay a greater first cost, his tire expense per mile will not be increased.

A Joke on the Sketch Artists.

During the last few years there have been printed many "instantaneous" photographs of racing cars going at speeds upward of a mile a minute. All these photos show the common peculiarity that all parts of the car seem to be forwardly inclined, suggesting a runner putting forth his best efforts. To the practical man it is quite obvious that the wheels and the body of the car cannot possibly deform to the extent indicated, and that the effect must be entirely due to a peculiarity of the camera. A German contemporary now explains the effect substantially as follows. In all quick-acting cameras the light enters through a narrow, horizontal slit in a shutter which is moved in a vertical direction in front of the sensitive plate. The slit actually moves downward, but as the image is inverted by the lens and the shutter is located between the lens and the sensitive plate, the rays from the lower part of the car strike the sensitive plate first, and the rays from the upper part a moment later, and as the car has moved ahead a short distance during the interval, it appears on the plate to be inclined forwardly. The actual cause of the effect, therefore, is the fact that a camera shutter does not expose the whole surface of the sensitive plate at the same moment, as it should in order to obtain an absolutely true picture.

Some of the sketch artists sent by illustrated publications to some of the recent European races to make hand sketches from life of the racing cars at speed, seem to have been of the impression that the cars actually lean forward when going at high speed, and have produced this effect in their sketches. It is very prominent, for instance, in the rather remarkable sketch of Louis Renault going at 80 miles per hour near Rambouillet in the last Paris-Bordeaux race, drawn by Joseph Pennell for an English publication.

Differential Safety Factors.

A mishap to one of the large imported cars during the St. Louis tour illustrates well how sometimes an expensive multi-cylinder car may be completely tied up by the breaking of a very small part. In the case referred to, the cam shaft broke through the pin hole where the driving gear was fastened to it, and as this shaft operates the valves and igniters of all the cylinders, it is obvious that the engine was thereby completely incapacitated. A multi-cylinder engine is, of course, much less liable to become completely inoperative than a single cylinder, as the breakage of any of those parts of which a separate one is provided for each cylinder affects only that cylinder, and the engine may be continued in operation with this cylinder cut out. In this connection it is interesting to note that all the recent long distance non-stop run attempts have been made with four-cylinder machines, and instances have been recorded where a spark-plug has been replaced in one cylinder while the engine was running. While it is hardly possible to replace inlet or exhaust valves while the engine is in operation, these parts can be readily replaced on the road by any fairly skilled driver, by shutting the engine down, and the breaking of any of these parts is therefore of no great importance—provided that spare parts are carried, as is always advisable. But the breaking of the crank-shaft, cam-shaft, cam gears or spark-timer always necessitates a tow to the nearest town, and is therefore extremely annoying. It would consequently seem logical to allow a greater factor of safety in the design of these parts than in those which cause only little trouble by breaking on the road. In a four-cylinder engine the parts absolutely essential to operation are comparatively few in number, and with the exception of the crank-shaft, their duties are comparatively light, so that a somewhat greater factor of safety would add only little to the total weight of the engine.

"Cheap" Awards.

Automobile competitions generally are demoralizing, owing no doubt to the want of proper control, and a gold medal award will soon mean very little as a mark of merit. These competitions have partially passed into private hands, and medals are offered as bait for entrants, being awarded for such easy performances that every car of ordinary merit is almost certain to capture one or more. In the recent White Mountain tour, for instance, every car, with one exception, was awarded a gold medal, and in the Long Branch events this week no less than thirty-five medals are to be distributed, we are informed. If this sort of thing continues, every manufacturer will soon have medals galore, and this kind of award will lose all significance, except that the owner considers it worth the trouble and expense to enter a car in these events. It is only reasonable, however, to expect that those manufacturers who can hold their own in a competition where only superior performances are awarded, will soon tire of these affairs and will withhold from them.

According to Mr. Akers-Douglass, there were 1,743 accidents to persons occasioned by automobiles, and 214 by motor cycles in the London-Metropolitan police district during the year ending May 31st. In these accidents 17 persons were killed and 601 injured.

Charging Automobile Batteries.

By Arthur d'Romtra, E.E.

An inexpensive outfit for putting storage batteries on charge in a garage, or in a stable if the owner houses his own vehicle, is illustrated in Fig. 1. It occupies very little space, and in the case of a garage a series of such charging boards may be placed on the wall, about eight feet apart, so that a large number of vehicles may be charged at a time, lined up in a row, backed up against the wall. One of these charging boards should also be installed near each repair pit, so that charging may go on uninterruptedly while repairs are made to the motor or other parts.

The charging board consists of a slate base provided near its top with two binding posts, to which the leads of a 110 volt constant current circuit are connected. The

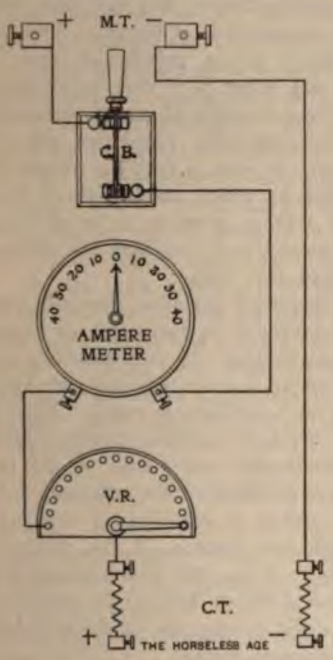


Fig. 1.

M. T., main terminals; C. B., circuit breaker; V. R., variable resistance, 2½ ohms maximum; C. T., charging terminals with cartridge fuses. Ampere meter reads both ways to 40 amperes.

positive wire then leads through an over-and-under-load circuit breaker, through an ammeter, a variable resistance of 2½ ohms, and a cartridge fuse of 30 amperes capacity, to the charging terminal. The negative wire leads directly from the binding post on the upper part of the board, through a 30 ampere cartridge fuse, to the outgoing negative terminal. To the outgoing terminals is connected the flexible twin cable attached to the male end of a "New York" charging plug. Forty cells being the standard number for automobile batteries, owing to the convenience in charging from a 110 volt circuit, a 2½ ohm rheostat gives all the variations in charging current required.

Should an automobile owner be unable to secure constant current service, and only alternating current be available, I would

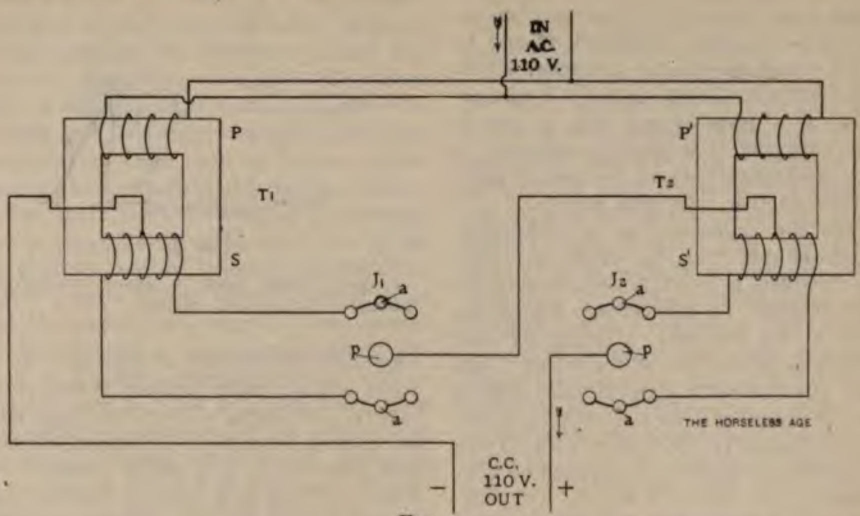


Fig. 2.

T_1 T_2, transformers; PP', primary windings in multiple; SS', secondary windings in series; J_1 J_2, two glass jars containing saturated solution of phosphate of soda; *aa*, six aluminum rods in each jar; *p*, perforated platinum cylinder. (Water circulating tube for each glass jar is not shown.)

recommend an alternating current rectifier, instead of an alternating motor connected to a constant current generator, as the former is very much cheaper, and requires hardly any attention.

Fig. 2 shows the manner in which the rectifier is connected. The rectifier for 110 volts consists of two transformers and two glass jars containing each a standard solution of phosphate of soda, six aluminum rods, one perforated platinum cylinder, and a helix of iron piping through which water is constantly kept flowing, for the purpose of keeping down the temperature of the soda solution.

The rectifier, of course, should be treated as any other source of current supply, and be equipped with cut-out, etc., as per Fig. 1, before being used for charging purposes.

Fig. 4 shows a handy combination for charging trays of 10 cells each, or, if necessary, complete batteries in a vehicle. This arrangement allows of a saving, in that only one ammeter is needed for about 12 different conditions: another advantage is that batteries may be connected as desired, and left to themselves over night. The apparatus is also a valuable adjunct to the equipment of an automobile battery manufacturer, and does away with the use of loose wires strung around, with the consequent short circuits, bad connections, leaks and breaks in the wires.

The apparatus shown in Fig. 4 consists of three panels, each panel having eight socket connections, the upper ones, 1, 2, 3 and 4, 5, 6, being 110 volt constant current and always alive, being connected to the bus bars, as shown. The top connection in each socket is always positive. Panel A has 4 charging sockets, 13, 14, 15 and 16, in series. Panel B has four charging sockets, 17, 18, 19 and 20, in multiple series. Panel C has 4 charging sockets, 21, 22, 23 and 24, in multiple.

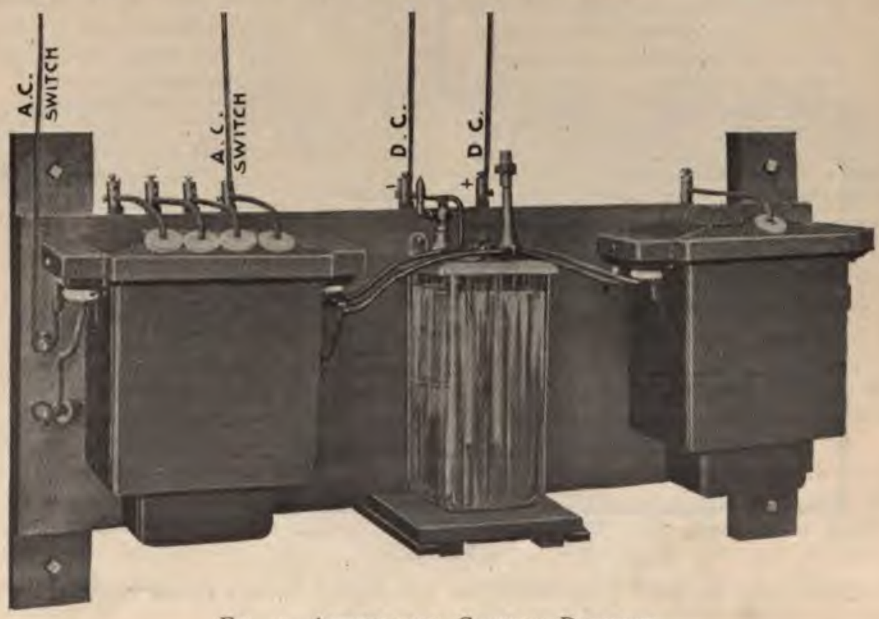


Fig. 3.—Alternating Current Rectifier.

Each panel has its fuse and variable resistance, as marked. Sockets 8, 10 and 12 are for connection to the ammeter, which has a flexible cord equal to a No. 8 wire attached to a plug as per Fig. 4 and 5. When this plug is inserted in either 8, 10 or 12, the ammeter shows the current passing through that individual circuit.

When the ammeter plug is withdrawn, a plug as per Fig. 5, which has been short-circuited, is inserted, thus keeping the circuit closed. To connect any one of the panels to the bus bars, a length of cord reaching from one end of the board to the other, and having a plug at each end, is used for coupling 1 to 7, 1 to 9, 1 to 11; or 2 to 7, 9 or 11; or 3 to 7, 9 or 11; or 4, 5 or 6 to 7, 9 or 11; as desired or convenient.

By coupling 6 and 11, for instance, with the coupling jack, as we will call it, inserting the short-circuit plug or ammeter plug in 12, we can either charge one, two, three or four 40 cell vehicles from panel C. By coupling 4 and 9, using the short circuit plug or the ammeter plug in 10, we can charge one or two 40 cell vehicles off 17 and 18, provided that 19 and 20 have a short circuit plug inserted. By coupling 2 and 7, and inserting 8 in either the short circuit plug or the ammeter plug, we can charge one 40 cell vehicle off either 13, 14, 15 or 16, provided that a short circuit plug is used in the three other sockets. We can therefore, charge seven 40 cell outfits off this board at any one time.

We now come to battery charging, for which purpose this board has proven very useful, and of great range and capacity. The reader must not think that the combination is as complicated as it looks, for I have, in each case, succeeded in getting the attendant to handle it correctly in less than two hours.

Manufacturers now universally put up their cells in crates, trays or boxes of ten.

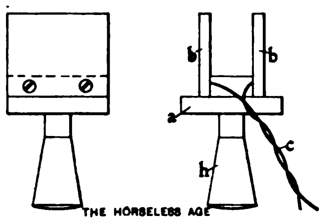


Fig. 5.

a, hard rubber block; *b*, copper contacts; *c*, flexible cord; *h*, wood handle.

Therefore, we connect a tray each to 13, 14, 15 and 16, which disposes of our 40 cell battery. Assuming we have four trays from the forming room to be discharged, we connect same to 13, 14, 15 and 16; short-circuit 8 and 10; with jack connect 7 and 9; connect to 17, 18, 19 and 20 four trays that need charging, and as the voltage of panel A is twice that of B, our B set of four trays will be found in the morning to be fully charged, and our forming room battery ready for another charge.

If you have four trays the voltage of which is out of step, connect them to 21, 22, 23, 24; connect the four trays you wish to discharge to 17, 18, 19, 20; short-circuit 10 and 12, and with jack couple 9 and 11. You will find that your four trays on panel C will even up, and when charged, each tray will have its full voltage of 10x2.2 = 22 volts. The above examples are only a few of the combinations possible, the ingenuity of the attendant continually discovering others for various conditions.

Mark one of your jack plug ends with red paint on the contact side you wish to use for positive, doing the same at the other end, and remember that on the panels the top contact of each socket is positive. I have had these panels in use for months, and not once blown a fuse. Finally, have your ammeter cord long enough to reach to any part of the board.

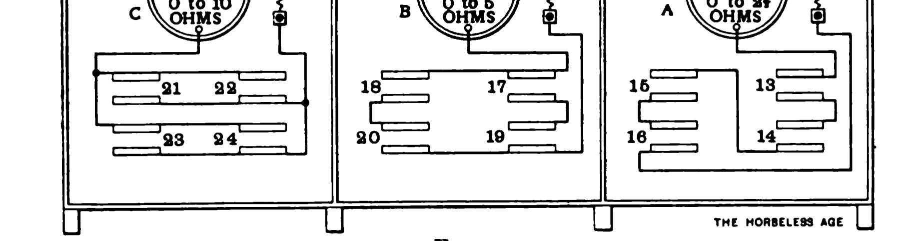


Fig. 4.

A, series panel; B, multiple series panel; C, multiple panel; V. R., three variable rheostats; 1 to 24, *twenty-four contact sockets.*

Automobile Electrical Equipment Difficulties.

By Robert G. Griswold.

Much has been written on the difficulties experienced with batteries, spark plugs, coils, etc., while in a great many instances little attention seems to be given to the proper installation of the batteries and coil. It is true that this difficulty seldom occurs in the better grades of high-price cars, but with some of the cheaper cars, difficulties of this character frequently occur, and the following remarks are intended to be of value to those who have had trouble of this character.

Defective Insulation of Dry Cells.

In the first place, too much care cannot be bestowed upon the installation of the dry cells, if these are the source of current. Dry cells are 'most always made in the form of a zinc cylinder which contains the active elements, and this zinc cylinder forms on electrode of the cell. This is then surrounded by a pasteboard case. Now while dry paper is a very good insulator, when very dry, it will absorb moisture, and then its insulating properties are greatly reduced. In fact, a case has recently been reported in which the moisture in these covers was so great as to cause almost a total short-circuit. draining the batteries in less than two days.

As commonly installed, the cells are generally arranged in two or three rows, and in close contact. In this position, nothing could make a more complete short-circuit when the pasteboard is moist. The current upon leaving the positive terminal (the carbon electrode) passes over to the zinc or negative terminal of the adjoining cell, and then returns to the zinc of the first cell through the medium of the moist paper-wrapper. While this slow leakage may not be perceptible at first, it is surely a constant drain on the life of the cell and will soon exhaust them.

How to Insulate the Cells.

The following method has proven most effective in checking such a leakage and thoroughly insulating the cell. The paper covers are removed and boiled in melted paraffin. The paraffin may be melted in a shallow dish and the cover slowly revolved in it. The bottom is similarly treated. Care must be taken not to heat the dish to such a temperature as to char the paper in contact therewith. The paper should be left in the paraffin until bubbles cease to be given off. While the covers are cooling off, wipe the zinc case dry and give it two thin coats of shellac varnish. When dry, the cell is slipped into the paraffin-coated case.

The box carrying the cells seldom has much room to spare, but if possible, when the cells are replaced, separate them by small, thin strips of wood that have been boiled in paraffin. The inside of the box should be coated with two coats of shellac varnish. The wooden strips should be placed between each cell, and the bottoms

and sides of the cells and the box. The cells will thus be effectually insulated and the method is cheaply and readily applied.

CONNECTIONS BETWEEN CELLS.

The question of connections between the cells is one of importance, although frequently passed over lightly. Since the output of a battery depends on the resistance of the external circuit and the voltage of the cells, it is of importance that each connection be made as perfect as may be. The constant vibration to which vehicles of this closs are subjected will loosen an ordinary contact in a very short time unless it is unusually tight. These connections should be made with No. 16 gauge rubber covered copper wire, and each wire made long enough to permit of several turns being taken around a lead pencil so as to form a spiral which will allow of some vibration without tugging on the binding posts. The ends are then bared of the insulation and a loop made therein about ¼ inch in diameter. These loops are then flattened by a blow of a hammer so that each wire terminates in flat washers, which are slipped over the binding posts and secured by the thumb nuts. All contact surfaces should be filed bright. Set the thumb-screws up hard, and if a similar set of screws can be obtained from a similar set of batteries, put them on the same screws, provided they are long enough, and set up hard. They will act as checknuts and prevent loose connections. Cells set up in this manner will operate with the highest possible efficiency throughout their life and give no trouble from short circuits.

GENERAL WIRING RULES.

The leads from the cells to the switch, coil and commutator should be installed with equal care. The insulation should be perfect and wherever the wires pass through a support, it should be bushed with a piece of hard rubber or fiber tubing. These leads are best made of No. 16 rubber-covered wire, having a braided sheath outside. This wire is used for incandescent light wiring and will withstand a tension of 110 volts.

The switch should be mounted on a hard rubber or porcelain block with the leads passing through large holes in the wood-work upon which the switch is mounted. It should be so mounted that rain cannot get at the terminals or wet the block.

WIRING OF THE SECONDARY.

The proper insulation of the leads from the secondary of the coil is perhaps as hard a problem as any. Even in small coils the tension between the secondary terminals will run into the thousands of volts, and to properly insulate such a pressure is difficult. In the first place, the terminals are often mounted on the outside case of the coil where dust can collect and form a path between them. Then, again, wood is only an insulator when perfectly dry, and as it absorbs moisture readily, it falls far short of some of the other insulators, such as rubber or fibre. A varnished surface will often condense upon it a film of moisture over which the high tension current will readily pass, and many assumed spark plug troubles are often nothing more or less than a short-circuit in the external circuit.

The leads from the secondary terminals to the plugs should be as short and direct as possible, and be kept as far from the metallic parts of the frame and engine as the construction will permit. They should be led through a fibre tube direct to the plug, and if the arrangement of the coil or coils is such that the tube can enter their surrounding case, so much the better. The resistance through which a coil works is not constant. The plug may give a good spark in the open air, but when the air is mixed with oil vapors and compressed, the resistance of the air gap is greatly increased, so that if the current can find a shorter, or at least a circuit of less resistance outside the cylinder, it will most certainly take it. The writer has had a half-inch spark jump to a dry pine block and pass through it to the engine frame rather than jump the gap in the compression chamber under 60 pounds compression. Another point that may be taken advantage of is to ground the spark-plug with a wire returning direct to the other terminal of the coil instead of connecting the coil to the frame and allowing the current to return through many poor joints. Every precaution that is taken advantage of to prevent short-circuits and leakages means just so much greater efficiency in the ignition apparatus.

UNBREAKABLE WIRE CONNECTIONS.

The difficulties caused by the wires breaking at the spark plug terminals may be obviated if the connection is made with a strip of ⅜ inch spring brass, No. 28, bent into the shape of the letter "S," the wire being soldered to one end and a hole being punched in the other to accommodate the screw. The vibration is thus absorbed in the spring without injuring the connection.

The same precautions apply in the case of the make-and-break method of ignition, with the exception that there is no secondary coil used to generate a high tension current, as employed in the jump spark system.

Case-Hardening.

By Frank N. Blake.

Case-hardening consists in changing a thin surface layer of either cast iron or machine steel to hardened steel, leaving the interior unchanged and as tough as it was before the treatment. There are several methods for accomplishing this end, the comparative merits of which will not be entered into here; the best results are obtained by processes too long and cumbersome for the ordinary individual to use, but there is a quick and easy way which, while not penetrating the metal to as great a depth as might be wished, is still of sufficient service to well repay for the small expenditure of time and labor involved; it is so easily done and of such benefit that there is little excuse for makers or even users of automobiles neglecting to give at least some of the smaller parts a hard coating that will protect them from wear so far as may be. Bolts, nuts, pins, wrenches, etc., should be case-hardened, both to increase their durability and to preserve their good appearance. Take, for example, the parts which are manipulated in tightening clutches and brake bands; the screws and lock-nuts are sometimes so located that the wrench will not go on the nuts and screws in good shape, and then, even if the wrench fits them, the corners are liable to become so rounded that it is difficult to make the necessary adjustments, and at the same time the parts are given a most unsightly appearance which offends the mechanical eye to no small degree. Any bolt or nut which requires occasional tightening should be hardened, even if it is so located that the wrench is easily applied. Journals must be hardened if the best service is to be obtained; there is no question but what hardening a bearing makes it run easier, as well as with less wear.

Sometimes a special tool must be made for some special purpose, and if it is to be used but little it can often be made of iron, then case-hardened and made to answer the purpose.

An easy and quick way to case-harden is as follows: Heat the article to a dull red by means of a gasolene torch or by any other suitable means, and then apply a lump of potassium cyanide to it, causing the fused chemical to flow over every part, then heat to a cherry red and plunge into cold water. Sometimes a bath of salt and water is used instead of plain water for the cooling.

Potassium cyanide is one of the most deadly poisons, and care should be observed both in keeping and handling it. It should be kept in a tightly corked bottle so that the air will not reach it, and should be handled as little as possible, and its fumes avoided. Some workers will not use cyanide because of its dangerous nature, but use yellow prussiate of potash instead; equally good results are sometimes claimed from the use of the yellow prussiate, but it is not so generally liked, one reason being that it does not so readily fuse and flow over the work as cyanide does so nicely.

Different samples of iron behave differently, some requiring more heat than others in order to produce the required degree of hardness. The part should not be heated too much, or the surface may become pitted or roughened.

LESSONS of THE ROAD

With a Runabout Through the Mountains of Colorado.

By Howard F. Shepherd.

Last June the writer made a trip in a popular gasoline runabout, part of which, at least, was over perhaps the worst roads this little machine was ever called upon to cover. The route was from Denver to Salida, Colo., by way of Colorado Springs, Pueblo, Cañon City, and up over the Royal Gorge to Salida.

The morning start began with a drizzling rain; but knowing the changeableness of our Colorado weather, it was decided to go. The only change made in the machine was to disconnect the muffler, which, however, seemed to make no difference in the power. I got off about 5 o'clock and proceeded leisurely to Sedalia. Here I replaced a lost oil can, and filled up with water. Lunch was had at Palmer Lake, fifty miles out of Denver. Colorado Springs was reached about 2 o'clock.

TOP PULLS OUT SCREWS.

Here I decided to stop and rest for the night. I spent the rest of the afternoon tightening clutches and nuts. The machine was equipped with a top, and I found that this top on the rough roads had pulled out the screws that held the seat. Longer screws settled this trouble.

The next morning it was quite cold, so I waited, thinking it would get warmer. It did not, however; but I started about 10. The roads were fine, and the wind was at the back, so the little machine ran nicely. The only trouble was the secondary wire coming loose from the spark plug. Pueblo was reached at 2 o'clock.

Here the hard part of the trip began. Although the weather was threatening and it was rather late, I decided to go on to Cañon City, forty miles. At the garage in Pueblo I was fortunate in meeting an owner of a car like mine, who lived in Cañon City. As I had found riding alone over dreary roads rather lonesome, I asked him to accompany me, which he did.

We got started about 3 o'clock, and had gone perhaps fifteen miles, when it began to snow. We did not mind this at first, as we had our top; but as evening came on, the snow increased to almost a blizzard. The roads, which were of soft clay, soon became very slippery, and caused the cars to skid. The rear wheels soon had no traction, and no progress was made unless one of us pushed. We reached a ranch, and borrowing some rope, wrapped it around our wheels. This did not seem to do any good; but we thought that as we were only ten miles from Cañon City, we would go on.

Our lights soon went out, it became very cold and the wind blew the snow in our faces; but we had left the ranch too far behind to go back. We were from 9 o'clock till 2 o'clock going the ten miles into Cañon City.

BEARING STUDS BROKEN.

The next day, upon examination of the machine, it was found that all the four studs on the crank-shaft bearings were broken. Also one of the caps was broken half in two. The only thing to do was to fix them, so with the help of my Cañon City friend, I started in to fix it. We drilled out the broken studs and put in ½-inch bolts, and had a blacksmith make an iron fitting around the cap, so as to hold the broken parts together. We did not have the proper tools to do this with, so it took us two days to finish it.

By this time the roads had dried up, and I decided to continue the next day. After the experience coming from Pueblo, I did not want to start again alone, so I got the porter at the hotel, a strong, husky coon, to go with me. We left Cañon City early the next day, and ran along very nicely to Bumback Springs, twelve miles out. The only accident that happened was a bottle of "Old Crow" dropping out of the machine and breaking, much to the disappointment of my fellow traveler.

At Bumback Springs we found a road branching off, and not knowing which way was right, took the wrong one—of course. The road I took seemed well traveled and gave promise of being a fairly good one. As we were now right in the heart of the mountains, the grades were frightful in some places, and I could not use the high gear at all. We ran along mile after mile at the same monotonous pace. I put oil in the gears about every half hour, and took water from every stream we passed.

We reached a place called Taclomar about 3 o'clock that afternoon. There is a postoffice at this place, and upon inquiring I found that I had taken the wrong road, but that I could reach Salida by taking a branch road about eight miles further on.

DRIVING WHEEL COMES LOOSE.

We were now about thirty miles from Bumback Springs, and Salida was forty miles away, so we determined to reach a ranch and stay for the night. As we were climbing a heavy grade a little farther on, I heard a grinding sound and the machine stopped, though the engine and chain were running. Upon examination I found that there was no key between the hub of the rear wheels and the axle, and that the pin through the end of the shaft and the hub of the wheel had sheared off, thus allowing the shaft to turn free of the wheel. I got the pieces of the sheared pin out and put a bolt through the hole. This fixed it all right.

As it was now almost night, we decided to stop at the next ranch, which was found after traveling about six miles. When we stopped at the ranch I opened the gasoline tank, and found it contained less than a half gallon of gasoline. There was no gasoline nearer than Cañon City. The only thing to do was to send for some. So the next morning I started the coon to walk to Taclomar, there to meet the mail carrier and ride with him to Cañon City and send some gasoline back to me by the carrier. As the carrier only came up to Taclomar every other day, I had three days to wait.

I spent the days at the ranch going over the machine. The third day the ranchman hitched up his horses and we drove over to the postoffice. There we found the carrier, and with him five gallons of the very precious liquid. When I got back to the ranch I filled the machine and got ready to start again the next day.

The next morning bright and early I started over the roughest and hilliest roads I had ever seen. The only way I could go up the hills was to speed the engine to its limit, throw in the clutch and get out and push. When it had "killed" the engine I would put a rock under a wheel and start it up again.

TRAIL INTERRUPTED BY CREEKS.

I had gone perhaps ten miles, when I came down a hill into a running stream, and was up over the hubs in mud before I could stop. A ranch was near and a team of horses pulled me out. I found that at every ranch there was always either a small creek or an irrigating ditch, which invariably ran right across the road. At these places the mud was always two or three feet deep. The only way I could cross these was to get going as fast as I could and go flying through them. I got stuck in five mud holes that day. In several cases I was able to get out by getting boards off the fences and working them in under the rear wheels. In one place a woman with a single old horse pulled me out.

That night I reached Whitehorn, a small mining town of perhaps twenty-five inhabitants. From there to Salida is only eighteen miles, but it is eighteen miles of the worst grades that an auto ever went over. The road for eight miles goes right up over a range of mountains, then down ten miles into Salida. I stopped at Whitehorn for the night.

The next morning I started out with pleasant anticipations of reaching my final destination. I was climbing a very steep grade, when I heard the same grind I had experienced before, and found that the pin I had put through the shaft on the rear wheel and the hub had cut the boss or end of the hub off. I walked back to Whitehorn for help, and rented a team of horses. I also got a long ⅜-inch bolt and some wire. I put the bolt through the hole in the rear axle shaft, and wired its ends to the spokes of the wheel.

MAINTENANCE AND REPAIRS

Road Repairs of Pneumatic Tires.

The thoughtful automobilist will always carry spare inner tubes on his car, and to him a road repair will usually mean the treatment of the outer shoe alone, and the insertion of another inner tube. But as it sometimes happens that in a single run the number of punctures is greater than the number of inner tubes carried, it may become necessary for even the most careful to put a damaged inner tube into condition to hold air. With skill and experience, it is possible to effect repairs of extremely bad punctures, but to insure success in even the simplest case, it is essential that certain simple rules be followed religiously.

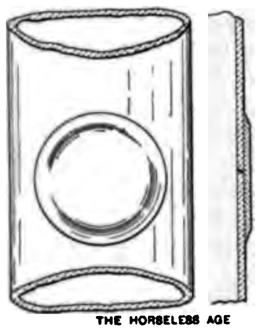


FIG. 1.

For the smallest puncture, a patch 2 inches in diameter should be used. The surface of the tube should be thoroughly cleaned for a space of at least ½ inch larger in diameter than the patch to be applied, by first rubbing hard with a bit of waste or cloth, moistened with benzine or gasoline, until all traces of chalk or sulphur have been removed, and then slightly roughing up the surface of the rubber with very fine sand paper. It is best to use the prepared patches which are procurable from the tire makers, but if a patch cut from an old inner tube be employed, this should be carefully treated on the under side in the manner indicated above, and the edges beveled, as shown in Fig. 1. It is better to cut the patch of circular shape, as a square patch will start to come off comparatively easily at the corners. Cover the patch and cleaned space on the tube with a thin coating of high grade, heavy rubber cement (inferior grades are worse than useless), and allow it to thoroughly dry; then apply a second coating. When the second coating has become "tacky" (i. e., not moist, but will stick to the fingers when touched) the patch can be applied. Hammer it well with a bit of wood and allow it a minute or so in which to "set" before pumping air into the tube. It is most important that the surface of the tube and the patch be cleaned thoroughly. If this is not done, failure is almost sure to ensue. It is also necessary to wait until the cement is quite dry and "tacky" before applying the patch. A moment spent in waiting at this point of the operation will save many repairs later on.

FIG. 2.

The treatment of cuts and gashes in inner tubes is a more difficult matter; but many cases are on record wherein cuts several inches in length have been successfully closed by carefully following the rules set down above, the operation, of course, being carried on on a larger scale than would be necessary for a small puncture. If good cement is used, the surfaces are thoroughly cleaned, and adequate patches are applied, a very bad injury may be healed, and the tube used for many miles.

If the injury to the inner tube results from some internal trouble, such as the pinching of the tube between other parts of the tire, no attention need, of course, be given to the outer shoe, further than to make sure that the conditions which caused the injury to the inner tube are eradicated, but if a nail has punctured it, or it has been cut by a sharp stone, or the like, it is necessary to give it attention, the amount depending upon the extent of the injury.

In the case of a nail puncture, the hole in the outer shoe should be covered by sticking on a bit of the prepared canvas, which the tire makers can supply, in order to prevent water and grit from working in between the inner and outer tubes. To do this, the same rules must be followed as in the case of applying a patch to the inner tube. Use wood alcohol, benzine or gasoline in limited quantities to remove the French chalk or talc which may be present. Water will not dry readily and will therefore prevent the patch from sticking properly. Furthermore, it will rot the canvas if the hole is sealed so that it cannot entirely evaporate. As a further precaution, a small amount of cement should be carefully worked into the hole from the outside.

In cases of cuts which extend through the outer shoe, a strip of canvas sufficiently wide to cover the cut completely and to extend beyond on each side, and long enough to catch between the shoulder of the outer shoe and the rim, should be fitted on the inside of the shoe before the inner tube is inserted (Fig. 2). This strip should fit closely to the inside of the shoe, and it is well to attach it to it for at least a part of its length, by using cement. The object of this strip is to prevent the tube from blowing out through the cut, and it should therefore be drawn sufficiently tight when the tire is attached to the rim to form a supporting band about the tube.

In replacing the tire, the inner tube should be rubbed well with talc or French chalk, and inserted, if possible, in such

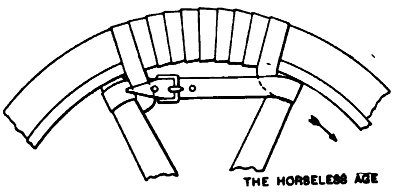


FIG. 3.

a manner that the patch will not come against the cut in the shoe, and care should be used that the loose ends of the canvas strip are securely caught between the shoulders of the tire and the edges of the rim. After a slight inflation, a leather sleeve, such as is now on the market for such purposes, should be laced tightly about the tire and the rim at the point of injury, as is shown in Fig. 3, and when this is done, the tire may be fully inflated.

If a strip be used in place of the leather sleeve, it should be wound about the tire and rim in the manner shown in Fig. 4. Each winding should overlap the previous one, and the winding should be done in such a direction as will bring the uncovered edges toward the rear of the car when the strap is at the top of the wheel.

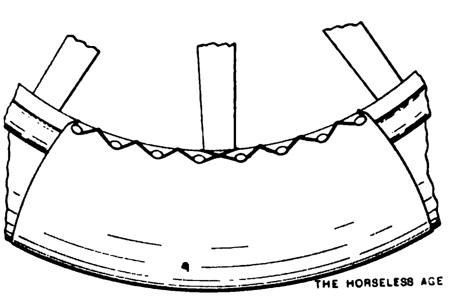


FIG. 4.

The sleeve or strap, when properly applied, not only affords a support to the injured shoe, but also prevents dirt and water from working into the cut, and an aggravation of the injury by the contact of the wheel with the ground.

COMMUNICATIONS

Through the Mountains of California.

Editor HORSELESS AGE:

While the motor world is agog over the really wonderful work of Harry Harkness and F. O. Stanley in climbing Mt. Washington, and the no less meritorious, if less sensational, records of many of the other cars, it may interest your readers to know what the writer did on a Sunday ramble a few weeks ago with a type of car that was not represented in the New Hampshire contest, a single cylinder, direct-gear Stanhope weighing 1,300 pounds ·ead for the road but without passengers.

On a Saturday afternoon I ran the car from Los Angeles to Redlands, a distance of seventy-five miles; this was done with the utmost comfort in four and a half hours without a missed explosion or an adjustment. The clock-like running of the motor was a great source of satisfaction, but the comfort lay in the way that car took the many California "chuckholes" that peppered the route. Long and flexible springs with universal joints enable the wheels to pitch and jump and twist on the roughest road, while the body of the car pursues the even tenor of its way. Such magnificent spring suspension and consequent ease of riding is unique in this type of car, as it cannot be attained if the engine is attached to the body or bed of the car; chains or propeller shafts are impracticable with such an elasticity of motion.

To return to our hill-climbing. The next morning I put in three and a half gallons of gasoline, opened the front seat and loaded up with two children (weight, 175 pounds) and two adults (355 pounds), altogether 530 pounds, which that lonely little cylinder lifted through a vertical rise of 3,800 feet that morning, 1,830 pounds, or very nearly one ton. We went to Oak Glen, a sylvan spot on a flank of old Mount San Gorgonio, which rears its rugged crest 11,800 feet into the shimmering blue of the California sky. Compared to its hoary summit, Oak Glen was "a hole in the ground," but it was only a thousand feet below the top of Mt. Washington and for a "hill" would not be sneezed at either in the Adirondacks or North Wales. Leaving the Redlands orange groves behind us, we soon reached a broad cañon or valley, which looked level with that enormous mountain range towering in front of us, but which our sturdy little motor, reminding us of a fussy tug in New York bay, negotiated on the high gear only by dint of the most perfect adjustment of mixture and spark. By and bye, when the grade got a little worse, we struck a couple of miles of dry deep gravel that had not yet been oiled and worked down. Out came the 355 and the feminine part of the 175, but the hill-climber relieved us from walking more than a quarter of a mile altogether. meadow larks carolled in the barley stubble; the mountain side, green with live oaks and the majestic sugar pine, loomed before us. Soon the road became beautifully hard and smooth, as all California "soil" roads are that are not ruined by heavy traffic, crude oil or washed out by winter rains. Up, up it wound, with occasional "rises" that necessitated dumping our live ballast on the front seat. As I have repeatedly carried four men in this car up Fourth street, Los Angeles, a 24 per cent. grade [?—Ed.], the incline of these stiff bits can be conjectured. Every two or three miles we would stop and fill up our water tank with the cold mountain water that dripped from troughs or ran down the side of the road. We were now running entirely on the hill-climbing gear, but although the water boiled a little, having no circulating pump, our little motor kept cool and stopped the instant we shut off the spark.

It soon became a delight to view the grand vistas spread out behind us. Great Horned toads and ground squirrels scurried out of the road before us; plump valleys of green and gold, brown foothills and the blue outline of Mt. San Antonio, fifty miles away, towering like a sentinel between the Mojave Desert and the fertile valley we had left. Now we were in the pines, one last terrific climb and the road fell away before us. We were at Oak Glen, 5,000 feet above the Pacific and fifteen miles from Redlands, our starting point. The cañon looked so inviting, with its waterfalls and banks of fern that I turned the car over to our feather-weight chauffeur, and with an occasional boost or a little extra weight on the driving axle, it scrambled up a rocky trail to a shady spot a quarter of a mile from the road and 300 feet above it. There, a mile above the sea, was our 1,300-pound automobile with the little motor that had banged away at old Gravitation without a sign of fatigue. Here we had lunch, and, after exploring the cañon, turned our faces homeward. It wasn't necessary to start the motor. For six miles we coasted swiftly and silently down a new road, winding in and out, now through a tunnel of branches and vines, then out on the backbone of a narrow ridge that fell away a thousand feet on either side. Finally, as the car slackened, I put the switch on, threw in the high gear and chug, chug went the engine. We passed through a mountain ranch, shaded by huge cottonwoods, and were rolling along at sixteen miles an hour, when we suddenly spied a big rattlesnake getting out of the road ahead of us. To shut everything off and jam on the brakes was the work of half a second, and before the car stopped we were all running to head off that prize before he hid in the scrub and rocks. Fortunately, he coiled at the base of a big oak, and with a long forked stick we teased him until he was too tired to rattle and almost too tired to strike, then pinned his head down and killed him. The beautifully marked skin, five feet long and ten inches across, with its pendant rattles will adorn a Stanford senior's den next winter.

Nothing else happened on the run home; we were soon down among the grain fields, scaring up wild doves, quail and rabbits with the sturdy "teuf-teuf" of our engine, and long before supper time were back in the orange groves of Redlands. The next day I ran the car back to Los Angeles without incident, reaching home with everything as tight and true as when I started on the 200-mile journey just two days before.

L. H. Johnson.

Gasoline Intoxication.

Editor HORSELESS AGE:

In reference to the communication of Charles H. Lemon in your issue of August 10th, I would say that this effect is not due to carbon monoxide, but to the vapor of gasoline. This is not necessarily poisonous, but is an anaesthetic, just as much as is ether or chloroform. Pentane, which forms the larger part of the volatile portions of gasoline, especially that part which forms a vapor at ordinary temperatures, is anaesthetic only when mixed with an excess of oxygen. This accounts for the fact that Mr. Lemon was affected only when he reached the air. This is the usual experience with gasoline. In the atmosphere saturated with vapor no evil effects are experienced, but only when the party affected reaches the fresh air. A case in point is that of a miner and plumber who went into a mine to repair a gasoline engine. They spent some time adjusting the vaporizer, but felt no effect until they got into the main airway. As soon as they reached the main airway they were overcome and fell unconscious to be found later. Unfortunately the plumber fell with his face in a pool of water and was drowned. In a suit which was the outcome of this case, I was engaged and made some experiments with cats, using an ether cone having inserted therein a sponge saturated with gasoline. The pure gasoline vapor had little effect, but by blowing down the ether cone in such a way as to drive in a supply of fresh air the cat was unconscious in about four minutes. The recovery was very much like that of a patient recovering from the influence of ether, which,

as any one who has seen it, will remember is a struggle, although not anywhere near so violent with gasoline. I understand that a physician in Cleveland has been using gasoline as an anaesthetic with considerable success, and as far as I know with no evil effects. This is a rumor merely and you may take it for what it is worth.

Another case in point happened in this town some years ago before the days of electric lights. The gasoline supply for the street lamps was kept in a cellar, and an attendant, a boy, was one day found unconscious, overcome by the fumes of gasoline. The physician who told me about it said the effects were very much like those due to ether. I trust these statements of the facts in these cases will prove of interest, as this is not the first instance of this kind, controversies having appeared in the automobile papers, if I remember rightly, a year ago.

E. W. Roberts.

Tire Repairs.

Editor Horseless Age:

In glancing over your issue of August 3, I find on page 119 reproductions of illustrations from our booklet entitled: "Continental Motor Tires; How to Treat and Repair Them." I am more than surprised that you do not mention that the information, as well as the illustrations were taken from our booklet. One would be led to believe that these illustrations were original with you, as you have the name of your paper under each cut.

The tire lever, Fig. 2, is patented, and since you make no mention of it being a Continental repair tool, some of your readers might undertake to manufacture it, in the belief that it is a new design originating with you.

In advising your readers to use a leather or raw hide sleeve, if the outer cover is cut or blown out, you are advising them of a method long since discarded by well-posted automobile drivers. A raw hide sleeve does not perfectly conform to the shape of the tire; water and sand can get in the injured portion of the cover and thereby rot the fabric, and eventually the cover would be made useless.

In case of a serious accident, we would advise the owner to take his tires off the rims, patch the inner tube, insert a repair plaster (composed of raw hide, covered with rubber solutionized canvas) in the inside of the outer cover, in order to stiffen up the cover, and after the cover is put on the rim, wrap the (rubber and canvas) bandage around the injured portion of the tire and strap each end to the spokes of the wheels. After the tire is properly blown up, this temporary repair will do very well for several hundred miles.

You fail to enumerate some of the most important sundries to take along, for example: an inner tube bag made up of canvas and rubber. By carrying inner tubes in this bag, you avoid injuring them with tire levers, pincers, lugs, valve parts and other metal parts usually carried in each machine. It is always well to have your inner tubes covered with French chalk, as this prevents friction.

You mention that the tire ought to be inflated to its proper pressure, but you do not state what the proper pressure is for the different size tires, nor have you mentioned that each pump ought to have a pressure gauge.

It is better for tires to be pumped up too hard than to be too soft, and after a long and fast ride it is advisable to let the hot air out of the tire and pump it up again. Following are the proper pressures: For 2½ or 3-inch tires, 63 to 75 lbs.; 3½ or 4-inch tires, 87 to 100 lbs.; 4½inch tires, 112 to 125 lbs.

Emil Grossman, *Manager*.
The Continental Caoutchouc Co.,

[The article referred to by our correspondent is only the first of a series on tire maintenance and repairs which we propose to publish. Our correspondent is entirely mistaken when he claims that the information and cuts were taken from a book published by his company, and seems to be under the rather erroneous impression that it has a monopoly on tire information. The writer of the articles is not connected with the tire trade, but has handled pneumatic tires of different makes since 1896, and offers first-hand information. The cuts shown in the article were made from drawings specially prepared in our office, and not from cuts in the Continental Tire Book. In preparing the article, the author, of course, refers to the publications of the different tire manufacturers, and while complementing his own personal observations by suggestions made in these booklets, does not intend to republish any portion of any of these. The tire tool shown in Fig. 2 in our issue of August 3 is a Continental tool, but that shown in Fig. 1 is used generally by tire manufacturers and users, as is the rawhide sleeve. To prevent possible misunderstanding, we do not propose to invent any new tools or processes for handling tires, but simply to describe those already in use.—Ed.]

A Run Across New York and Massachusetts.

Editor Horseless Age:

The writer has just completed a trip across New York State, and after reading the accounts of the troubles and hard luck encountered on the St. Louis run, I am convinced that I either do not know how to run my car so as to get all there is in it out of it, or I have been unfortunate and have purchased a freak machine.

Accompanied by my wife, I left Buffalo about 9:30 A. M., on August 5th, and ran through Batavia and Avon to Mt. Morris, where we spent the afternoon and night.

The next morning, Saturday, we took two friends who were to accompany us as far as possible and return by train at night. We left Mt. Morris about 9:00 A. M. and had a beautiful run down the valley of the Cohocton river to Elmira, and up the Susquehanna to Binghamton, landing there at 7 P. M. The odometer showed that we had made 153 miles on the run. The roads were rather rutted from Mt. Morris to Dansville, but from there to Binghamton they were in fine shape, with the one exception of through Corning. In this city they were the worst I ever traveled over: deep holes and black mud.

Sunday we left Binghamton at 10 A. M. and ran to Albany, 146 miles, with little to mar our pleasure, and reached the latter place at 7:30 P. M. The route from Binghamton to Albany lies through a beautiful country, and one is enchanted with the views obtained from the many hills which are topped on the way.

Through the country the roads were uniformly in fine shape and through the villages they were as uniformly wretched. Many times I was compelled to shift back into second and often into first speed in order to pull through what looked more like a barnyard than a village street. I cannot understand how civilized beings can endure that slimy, semi-liquid mass which extends from curb to curb all through villages made up of handsome houses and delightful surroundings. Can the inhabitants offer any excuse for the situation?

Just west of Schoharie we met "Young-Man-Afraid-of-His-Horses," and while we were stopped waiting for him to get over his fright and get his horses by the machine, a young farmer stepped up behind us and remarked: "If you don't get that —— thing out of here I will smash —— out of it and you too!" A good disciple of Magistrate Cornell and with fully as much courage, for when my wife asked him what he said, he climbed over a wall and hid in the "tall grass." This was the only rude remark heard on the trip.

The clerk in the Ten Eyck at Albany is an enthusiastic motorist, and the tales he told me of the trip from Albany to Springfield made me shudder and I, instinctively, "tightened my belt" when I started out. We crossed the toll bridge over the Hudson at 11:30 and reached Springfield at about 6 P. M., being delayed some time near Westfield locating a loose connection in the wiring.

For some miles east of Albany the route lies through a rather uninteresting country, but after passing Malden Bridge the country becomes more rugged and the view more interesting at each turn of the road.

As we topped the second long hill near

Becket, we stopped to admire the wonderful scenery spread out to the east, west and south of us. It must be seen to be appreciated. And then the run down grade through the valley of Walker Brook and the Westfield River is like passing through fairyland. At Springfield I was told of a lot of motorists who were arrested for speeding and all convicted. Some paid their fines, but most of them appealed. When the cases of the appellants came up for trial the sheriff who made the arrests forgot (?) to appear and they all went free.

The run home on Tuesday was without incident. We left Springfield at 10 A. M., stopped a couple of hours at Lake Chaubunagungamaug for a "fillin" luncheon and reached here at 4:15 P. M.

On the whole run of 620 miles we had no trouble with the machine other than the loose connection already mentioned. No broken springs, not a spark plug changed or cleaned, in fact, it was not necessary to take a single tool out of the box. We did not have to tow telegraph poles and, really, I fail to see how others got so much more excitement out of their runs. A. A. Young.

[If our correspondent should happen to run across any of the St. Louis tourists, we are pretty certain that they would not admit having had even so much as a broken spark connection.—Ed.]

What Caused these Mishaps?

Editor Horseless Age:

Can you suggest causes for the following accidents that happened to my automobile? Its engine has two cylinders, 4¼ by 5 inch, and it weighs about 1,200 lbs. with tonneau. While on a level macadam road, the rear wheels suddenly stopped turning, the car stopped in about a rod and the engine continued turning until the switch was opened. The crank shaft was found to be broken between the fly wheel and driving sprocket without apparent flaw. Could it be that the spark timing lever had been jarred so as to set it too far advanced, and too early explosion did the damage?

A knock appeared in the engine, and on opening the crank case one connecting rod had come off from the crank, because the nut on one bolt which fastened the bearing cap to the connecting rod of the crank had pulled off, stripping the thread, and the other bolt at the same end of that connecting rod had broken.

Later, at the same place, the crank was broken in such a way that the part of the crank held in the grasp of the outer bearing of the connecting rod was broken away from the rest of the crank, its broken surface being perfectly smooth and without apparent flaw.

Why would an engine crank much harder after a little use than when new, nearly as hard with release open as closed? H. P.

[The first mishap indicates that the rear axle locked in its bearings in some manner, and the sudden increase in the pull of the chain caused the shaft to wrench off. The others indicate that the piston binds in the cylinder. The piston pin may have worked to one side and caused the binding. Too early ignition may possibly have been the cause of breaking the crank pin, but could not have caused any of the other troubles. We would suggest that you take the engine apart and examine it carefully, which should disclose the cause of the trouble.—Ed.]

Popping Burner.

Editor Horseless Age:

I have on a steam car a Melrose kerosene burner, and at times it explodes with a loud report and flashes considerable fire under the wagon. Can you tell me what the trouble is, and how to remedy it? By turning off the main fire and starting up at a fairly good speed the flame is drawn out through the exhaust, but in case I was stopped or going up a stiff grade the flame might set fire to the car; besides it is very annoying. This seems to happen only when the regulator lets on the main fire and would seem to indicate that the pilot goes out and that the heat retained in the burner set fire to an accumulation of gas.

John S. Adams.

[Perhaps some of our readers familiar with this type of burner can suggest a remedy.—Ed.]

Unreliable Gauge Glass.

Editor Horseless Age:

I am the owner of a steam runabout that shows a marked peculiarity in reference to the registry of water in the gauge-glass, as compared with locomotives. If by chance the top pipe leading to the gauge-glass be submerged so that the glass is completely filled with water, from that time the glass shows a false registry, and continues full of water, irrespective of the height of the water in the boiler. After ten or fifteen minutes the gauge-glass becomes cold, showing a complete cessation of circulation.

At first I supposed this to be due to one or both passages of the gauge-glass being closed or obstructed, but all connections from the boiler to the gauge-glass were removed and found to be perfectly clear. I then removed the upper automatic valve, that is used to shut off connection with the gauge-glass, should this be broken. This made no difference. I then removed the lower automatic valve, without result, there being absolutely no change in the registration.

As I live in a hilly country, where it is advisable to fill up the boiler well before starting on a long, heavy up-grade, this is quite a serious matter, as it involves stopping and blowing out the water column as well as the gauge glass, to ascertain the true water level.

I have burned my boiler badly on one occasion through this cause, and on three occasions upon blowing out the gauge-glass, have found the actual water level to be such that the glass showed only one-half inch, although just previous to blowing it out it had been, apparently, completely full of water.

I am an old engineer, have run marine engines, locomotives, and hoisting engines, and thoroughly understand the idosyncrasies of the water level in boilers of this type, as well as what to look for when boilers are foaming.

I attribute the phenomenon to the fact that the boiler when steaming hard is practically filled with water and vapor, up to its top and, in consequence, if the water gauge be once completely filled, the slight difference in pressure is insufficient to overcome the capillary attraction in the gauge-glass and its connections.

It is probable that others have had this same trouble. If so it would be of general interest to know what measures they have taken to remedy this defect. In the meantime, I would caution new owners of steam vehicles, should they once fill up their gauge-glass, to guard against this difficulty.

"Dutch."

Ignition Generators.

Editor Horseless Age:

Mr. Clough's able article on "Ignition Generators" in your issue of August 3 contains a statement that is not always borne out by experience. He says, "The power absorbed by a magneto is hardly noticeable when run by a powerful engine, but when applied to a very small engine, the power which it demands is quite perceptible." For auto-work we need consider nothing smaller than the motors in common use, few of which run under 6 h. p., and on motors of this size or larger, I maintain that a suitable mechanical generator driven from a motor adds to the power of the motor instead of taking power therefrom. This sounds paradoxical, but it is a fact nevertheless and frequently demonstrated. Every automobilist knows that when the batteries are weak, the motor lacks life and no amount of spark advancing or juggling with the mixture will make up the defect, but let a new battery be substituted or change the vibrator of the coil, so as to get a better spark, and the result is noted at once in the decided increase of power. If this is true with the jump spark, where probably half the electric energy is lost in the spark coil, you can readily imagine how much added vim will be found when a make and break spark the size of a

match head is substituted for a jump spark that makes a hole too small to see. This result is not a matter of imagination, for every well informed automobilist knows of it, and it can further be demonstrated by brake tests. Of course, a generator needlessly large will give a wasteful current and burn away the sparking points without corresponding gain, but there are plenty of devices on the market to-day free from this objection. I have used small dynamos which required so much power that their pull was quite perceptible when turning the motor over by hand; but so little energy is required for sparking purposes that a good spark may be produced by twirling a magneto with one's fingers, so it is out of the question for the motor to feel this added load. The average water pump is a much heavier drag, but nobody kicks about this, although it is not absolutely necessary, as is a good sparking device.

We have been using mechanical generators, both dynamo and magneto, for more than eight years, and there is now no trouble to get these devices, if the public will but ask for them. Until they do, many makers will continue to give them dry cells, because they do not cost so much. Nor are the makers to be blamed for this, as nobody pays them for educating the public, and most of the public are looking for something cheap, regardless of the after-happenings, such as repair bills and maintenance cost.

CHAS. E. DURYEA.

Funny Kansas Editor Has Narrow Escape.

CONCORDIA, KAN., August 10.

Editor HORSELESS AGE:

I inclose a clipping which may be worthy of consideration. D. R. C.

(Enclosure.)

We note by the Beloit papers that Andy Manifold runs his new automobile fine and dandy, and handles it like a veteran chauffeur. We are glad of it. We can make a different report, though. When he came down here to buy it, Coughlin brought the machine, with Manifold in it, past the Kansan office and asked us to get in and take a spin with them. Coughlin took the thing all over town and it was so docile that you could milk it on either side. We got down past the old fair grounds and after stopping long enough to explain the complete mechanism of the thing to Andy, Dave told him to take the machine and run it. Andy was "game" all right enough, and took the driver's seat and grabbed the tiller. We were in the bull pen in the rear of the thing and the back door was locked with a combination we did not understand. There are two pedals and an octave coupler on the floor of the thing within reach of the driver. On the side there are a double bass attachment and a diapason stop, besides three or four other levers with no brand on them—Andy tried to play all the pedals, stops and levers at the same time and we headed for a cornfield. Dave laughed, but we saw nothing to cause any unusual degree of hilarity—with the back door locked and the blamed thing acting like a maverick at a round-up. Just as we had made a good start at climbing out over the back porch of the thing, Andy grabbed the starboard lever and the craft lurched ahead over a box culvert into the roadside ditch, he didn't have hands and feet enough to tackle all the levers, couplers and pedals all at the same time, but he did the best he could, and got most of 'em, and as we thought we were going to be rescued by slipping off the poop deck, the thing commenced going straight backward faster than a Central Branch pay train. We made several signs of distress we've learned in the lodges to which we belong —but Andy didn't see any of 'em, he was busy. There was at that time only one solace left to us—our last assessment in the Woodmen and Workmen had been paid and we resigned all other interests to Him who notes the downfall of a poor editor as well as the fall of a measly English sparrow. By this time Andy had her plowing through a forest of sunflowers, headed straight for a telephone pole which he evidently intended to make her climb, but, by this time, Coughlin had laughed all that was good for him in one day, so he put one hand on the tiller, put his foot on some mysterious protuberance that connected with the flock of machines in the basement of the thing and brought her back into the right-of-way where she was as tractable as Walter Darlington's yellow pony. Andy had sweat a quart in two minutes and as soon as the color came into his cheeks again and his eyes got settled back into their sockets he expressed himself forcibly with just one exclamation—he said: "dammer." Andy has since learned the mechanism of the machine—we have been content to learn simply the combination for unlocking the back door of it.

Explosion Engine Queries.

Editor HORSELESS AGE:

Please advise me what size of radiator is required for a triple cylinder engine 6" x 4¾" at 1,000 r. p. m. The jacket is 6" x ⅜". The company sold me a coil radiator of ½" tubing, about 50 ft. in all, stating its capacity was 24 h. p., but it fails to do the work. H. DILLING.

[The amount of radiating surface required varies with the arrangement of the coil. Supposing that your engine is of six inches bore and 4¾ inches stroke, it would be rated at about 27 to 30 horse power, and as from 3 to 4 feet of tube is required per horse power, according to arrangement, you would require from 80 to 120 feet. If, however, your engine is of 4¾ inches bore and 6 inches stroke, it would be rated at from 16 to 18 horse power and require from 50 to 70 feet of tube.—ED.]

Editor HORSELESS AGE:

Kindly answer the two following questions in the next edition of your valued paper:

1. How should four rings be placed on a piston to be air-tight?

2. Can piston rings be reset so as to hold compression securely?

L. M. GILMAN.

[The machining of piston rings was explained in the HORSELESS AGE of June 18, 1902. The four rings are so placed that the joints come at equal distances apart; in other words, are spaced equally over the circumference. Old rings, worn out of true, cannot be reset to hold compression.—ED.]

Editor HORSELESS AGE:

What would be the objection to using brass for constructing the cylinder of an air-cooled gasoline engine instead of cast iron? Has brass ever been used in this connection, and, if so, please let me know for what reason its use for this purpose was discontinued? F. M.

[Among the reasons why brass is not used in making gasoline engine cylinders is that it expands very much more with heat than cast iron, and that it would consequently be difficult to keep the piston tight, and at the same time prevent binding. Another reason probably is that brass loses much of its strength at high temperature. This material has been used by various inventors, but never successfully.—Ed.]

Editor HORSELESS AGE:

For a 3½x4-inch upright gasoline engine of the marine type, how much compression space is proper for running at high speed, and what is the rule for calculating the compression space? What size of fly-wheel is needed, and what is the smallest possible inlet and exhaust valve outlet? A. L. M.

[A compression space equal to one-third the cylinder displacement will give you a suitable compression. A diagram showing how the compression varies with the volume of the compression space was published in our issue of July 13 last. The fly-wheel you might make 12 inches in diameter, and weighing about 60 pounds. The inlet and exhaust valve should not be less than 1⅛ inches clear diameter each.—ED.]

The hereditary prince of Siam recently started on an automobile tour from Vienna to Paris, by way of Switzerland and Northern Italy.

NEW PARTS

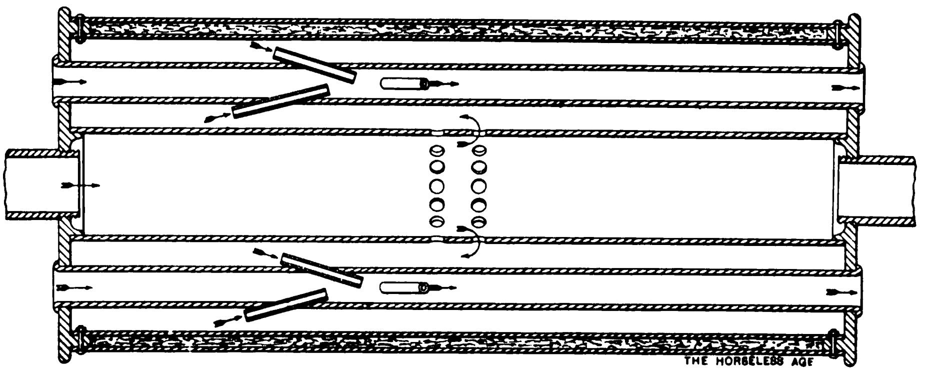
The Monitor Ignition Battery.

The American Storge Battery Co., 172 and 174 South Clinton street, Chicago, are bringing out a standard type of 20 ampere-hour cell for ignition purposes, sold either singly or in batteries of 4, 6 or 8 volts. The cell is put up in an acid-resisting, enameled metallic case and is carefully insulated therefrom. A large vent-hole is provided in the cover of the case, between the two binding posts, and is effectually closed by a rubber stopper having a gas valve or trap, to allow the gas to escape. All the batteries are 7¾ inches high and 5 inches wide, the length varying with the number of cells, being 3¾ inches for two cells. The weight of a two-cell battery is 11 lbs. The company also furnishes a current tap for charging the battery from a lighting circuit through an incandescent lamp.

The Bates Muffler.

We show herewith a sectional view of a muffler invented by F. E. Bates, of Northfield, Minn. In this device the injector principle is made use of to mix cold air with the products of combustion before they are discharged to the atmosphere. The muffler is hung lengthwise under the car, and the end shown at the left in the cut is the forward end. The exhaust products enter through the central tube at this end, or they may be led into the central tubes at both ends. After expanding in the central chamber they pass through the perforations in the wall of this chamber, to the outer chamber. These perforations have an aggregate area double that of the exhaust pipe, and consequently do not offer any material resistance to the passage of the gases. The outer chamber is penetrated by a number of tubular flues expanded into the headers of the muffler. Through the wall of these flues are passed short lengths of small diameter tube, at an acute angle, the end inside the flue pointing toward the rear of the car. The exhaust gases expand further in the outer chamber, and then pass through the small inclined tubes into the flues, through which they are discharged, their passage through these flues drawing cold air into them, which mixes with the gases and reduces their temperature and pressure.

The muffler is made with two cast iron heads, and two galvanized iron drums form the outer shell, the space between the two being filled in with asbestos flour. When the exhaust is led into one end only, a cutout can be fitted to the pipe at the other end.



THE BATES MUFFLER.

Long Bonnet-Front Radiator.

The Long Mfg. Co., Chicago, have recently brought out the radiator shown in the cut herewith, designed to be located at the front of a Mercedes type bonnet. It is claimed to have cooling capacity for a 24 h. p. motor—a four-cylinder 4½" x 5" for instance. It contains 180 feet of ⅜-inch tubing with spiral flanges, the separate tubes being arranged vertically. The apparatus complete weighs 55 lbs., and has a water capacity of 3 gallons. Its over-all dimensions are: 28 inches in width, 25 inches in height and 5 inches in depth.


THE LONG RADIATOR.

Club Notes.

DAVENPORT (IOWA) A. C.

The first club run was held recently, the destination being Le Claire, where a lunch was partaken of.

MASSACHUSETTS A. C.

The club's new garage with accommodations for 200 cars and all the most modern conveniences has recently been opened.

PADUCAH (KY.) A. C.

Organization was effected and the following officers elected on July 28: Col. Ben Weille, president, and Dr. Frank Boyd, secretary and treasurer.

RHODE ISLAND A. C.

The third club run of the season was held last Saturday. A large number of cars ran to Onset, Mass., in the afternoon and returned to Providence Sunday.

LYNN (MASS.) A. C.

At a recent meeting officers were elected as follows: Waldo L. Pevear, vice-president; F. L. Johnson, Hadley B. Jones and C. W. Marsh, directors; George A. Sprague, Thomas A. Kelley and Murdock E. Smith, trustees.

MUSKEGON (MICH.) A. C.

A club run was held recently to Grand Rapids, the following members taking part: Mr. and Mrs. C. J. Dove, Mr. and Mrs. M. H. Powell, the Misses Lunsford, Mr. and Mrs. W. E. Thornton, Max Loescher and Otto Loescher.

LONG ISLAND A. C.

Temporary quarters have been secured in a large building on Pacific street, near Sixth avenue, Long Island City, which has storage space for nearly two hundred cars. The new clubhouse at the entrance to Prospect Park will be ready for occupancy early in the fall.

CEDAR RAPIDS (IA.) A. C.

At a recent meeting the following officers were elected: President, Glen M. Averill; vice-president, R. P. Taylor; second vice-president, O. W. Lyman; secretary, G. L. Rothrock; treasurer, J. L. Bever, Jr.; directors: G. M. Averill, R. P. Taylor, O. W. Lyman, G. L. Rothrock, O. Brandenberg, J. L. Bever, Jr., W. G. Haskell. Plans were discussed for holding club runs and dinners.

LANCASTER (PA.) A. C.

The club was organized and the following officers elected on July 16: J. D. Rider, president; Dr. S. T. Davis, vice-president; Dr. E. B. Slyas, secretary; Dr. P. P. Breneman, treasurer. The Board of Directors was empowered to secure counsel to petition the court to appoint viewers to inspect one of the turnpikes which will be selected by the Board. If it is found that the turnpike selected does not meet the requirements of its character an injunction will be asked for to restrain the company from charging toll until the road is put in proper condition.

A. C. A.

The club is taking active measures to suppress the increasing tendency on the part of deputy sheriffs and others to use guns to hold up automobilists who travel over the principal roads of Long Island. During the past week two new cases have come to its notice, and both defendants have been discharged through irregularity of court proceedings.

OUR FOREIGN EXCHANGES

The Reckless-Driving Habit.

A very timely article by Claude Johnson, former secretary of the Automobile Club of Great Britain and Ireland, appeared in a recent issue of the *Daily Mail* of London, dealing with the subject of reckless driving and the resulting accidents. This article ought also to be of interest in this country, and we reproduce it therefore in full. It might be mentioned in this connection that Mr. Johnson was among the first in England to recognize the evil influence of organized road races in encouraging unlawful speeding on the highways, and it was he who led the movement of the A. C. G. B. I. to secure a radical change in the conditions of the Gordon-Bennett cup competition.

"Accidents occur in motoring, and if the driver survives he always tells the same story—he was going not more than ten miles an hour (why always ten?) and he could not understand how the calamity was brought about.

"As secretary of the Automobile Club from its foundation in 1897 until last year, it fell to my lot to be driven by many drivers, professional and amateur, and I am bound to say that I have come to the conclusion that a very large proportion of drivers take too many risks.

"In touring, when there is no necessity for hurry, risks are incurred which are quite inexcusable except in a race.

"I can recall a few examples, which may be of interest now.

"In the early tours of the Automobile Club I frequently had to remonstrate with a light-hearted, pleasant young fellow who drove a motor-wagonette hired by the club. He would drive up to an hotel door at full speed, cram on his brakes, pull up with a jerk which threw the passengers in a heap at the forward end of the car, and then look round with a satisfied look, as much as to say, "That's the way to do it." He was incurable, poor fellow. Remonstrance was useless. He drove a heavy load of passengers full-tilt down Harrow Hill, jammed on his brakes, wrecked the car, and killed himself and one of his passengers.

THE MOON'S TRICKS.

"A well-known amateur who has owned many cars was driving me on a fast car by moonlight. The road was alternately black and white, the black being the shadows of trees and bushes, the white the moon-illumined road surface. Suddenly my friend, to my horror, turned sharply to the right. A heap of stones at the roadside had been mistaken by him for the road. We struck the stones, bounced over them, ran along with the offside wheels in a ditch, across the road, again into the ditch on the other side, and eventually came on to the road again. No great harm was done, but the steering gear had been disorganized, which accounted for our erratic progress after the first impact.

"In 1900 I was driving a 12-h.p. Panhard by night. I had driven some distance, and then handed the steering-wheel over to a mechanic of great experience. It was very dark, and rain was falling in sheets. The road turned to the left. I was terrified to realize that the driver had not noticed this fact, but had mistaken the white wall of a cowshed, straight ahead, for the road in perspective. We had an easy escape that time, as we got off with a broken car, but no broken bones.

PESTS.

"I know some amateur drivers who are wonderfully skilful in traffic. To be driven by them is an experience. They drive, without slowing down, at gaps in the traffic which ordinary drivers would consider could not possibly afford passage for the car. They laugh as they see their passengers 'hold tight,' curl up their toes, and prepare for the smash which appears inevitable. They are very pleased with themselves, and are regarded by young beginners as marvels. But they do not like to be reminded of the very long list of accidents which have attended their 'trick' driving—upset vans, upset pony carriages, and sometimes, alas, upset human beings. Apart from their accidents, they alarm pedestrians, and instead of being admired should be regarded as pests.

"One of the oldest professional drivers in this country made a disastrous mistake. We were driving some 'authorities' with a view to impressing them wth the advantages and safety of motor-cars. After luncheon the 'authorities' waxed valiant, and urged the drivers to drive as hard as they could. The old hand misjudged the speed at which he could take a corner, and drove the motor-wagonette through the corner of a church, landing his car and the passengers among the wrecked pews inside. It took some hours to remove the masonry from the heads of the passengers, but fortunately and miraculously there were no deaths.

GENTLEMEN V. PROFESSIONALS.

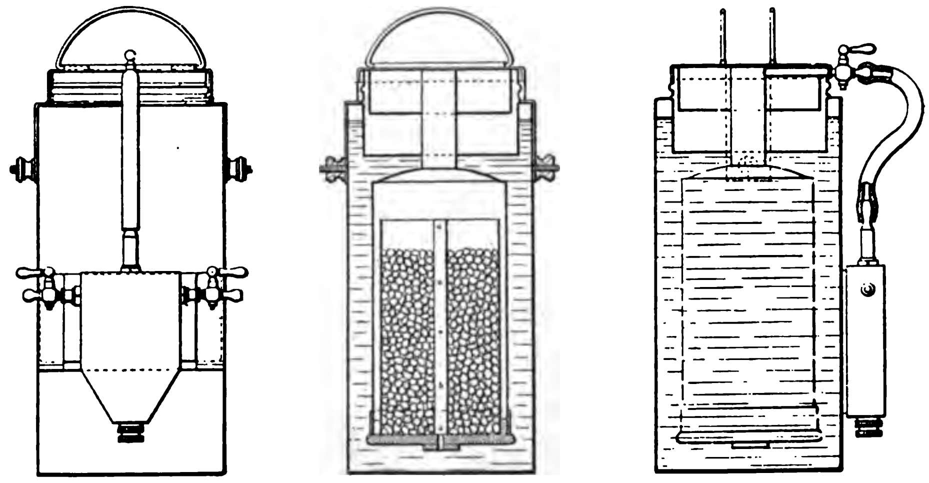
"So little thought have these reckless drivers of the 'possibilities of the road' that they will drive around a corner on the wrong side in order to 'take it' faster than they could if they were to keep to their proper side. A friend of mine was ascending a hill on a twisting road when, on turning a corner, he came face to face with a car driven by some young motorists, who were descending at full speed on the wrong side. They swerved out, just missing my friend's car, but could not round the corner. Their car crashed through the hedge, plunged nose downward into a field, and the young fellows continued their journey through the air, finally falling heavily to earth. My friend rushed to their aid, and, on inquiring if they were badly hurt, was met with the cheerful rejoinder, 'No, thanks; but we were going a bit, weren't we?'

"Very often it seems to me that it is claimed that all accidents are due to careless mechanics. My experience is that there are as many amateur sinners as professionals who err.

"The pity of it is that the motor accidents to which the newspapers give such wide publiciity are liable to lead the public to think that motors are dangerous, whereas in the hands of a sober, careful man they are, in my humble opinion, far safer than horse-drawn vehicles. The motor movement has, indeed, good cause to hate the motor fool."

The Zanardini Acetylene Generator.

The Zanardini generator for automobile purposes, made in Milan, Italy, carried off the first prize in several competitions for apparatus of this kind held in France last year, and seems therefore to possess special merits. The device consists of a prismatic tank adapted to contain the water to be fed to the carbide tank, which is of cylin-



Zanardini Acetylene Generator.

drical form and located centrally within the water tank. A central stand pipe with small perforations in its wall passes up through the carbide container and is open to the water tank at its lower end. The water rises in the stand pipe by the pressure of the head maintained in the water tank, and when this head becomes low, by capillary action; it attacks first the carbide around the central pipe, and gradually penetrates outward. To facilitate the recharging and cleaning of the carbide container, the bottom cap is threaded on its outside and is screwed into an outer cylindrical shell. This shell is provided at its top end with a central tube, through which the gas rises, then flowing through a small horizontal tube through the wall of the water tank, where it passes a valve, and then down through a rubber hose to a condenser at the side of the generator proper. In passing through this condenser the gas is deprived of the steam or water vapor generated by the heat, due to the reaction of the water and the carbide. The water collects in the bottom of the condenser and can be readily drawn off. The water is taken from the condenser through one or more outlets near the top, controlled by valves.

When it is desired to stop the generation of gas, it is only necessary to shut the valve near the top of the water tank. The gas pressure in the generator will then accumulate rapidly and stop the flow of water into the carbide container. Presumably there is a safety valve to prevent an abnormal pressure accumulating in the generator.—*L'Automobile.*

Number of Cars in Great Britain.

On Midsummer Day last there were in the United Kingdom 18,340 motor-cars and 21,521 motor-cycles, while driving licenses issued totalled 53,169. These figures have been compiled by E. S. Smith from the 212 registering authorities concerned. Nearly 16,000 of the cars are registered in England, while Scotland, Ireland and Wales divide the remainder between them. They were divided as follows:

Midsummer, 1904—Private purposes, 14,233 cars, 16,991 cycles. Business purposes, 2,164 cars, 3,158 cycles. Private and business, 598 cars, 1,372 cycles. Heavy goods haulage, 902 cars, no cycles. Public passenger service, 443 cars, no cycles. Total, 18,340 cars, 21,521 cycles.

Under the title of Nordisk Motor Union, the motor builders of Norway, Sweden and Denmark have joined together for their mutual benefit. A committee appointed to formulate a constitution comprises as members MM. Ringer and Houmoeller, of Denmark; Triesson and Swenson, of Sweden, and Gulowsen and Zund, of Norway.

A member of the Cardiff, England, Health Committee stated recently that the corporation motor wagons now in use saved £100 a month compared with horse haulage. More motor-wagons have been ordered.

The young King of Spain has just bought his first automobile, and takes a delight in driving it himself. It is to be hoped that King Alphonso will set to work to make improvements in the roads in Spain, which leave a great deal to be desired.

A strong fraternal feeling exists between automobilists in England. They inform each other through the press of the location of police traps, the quality of work done at garages, and latterly also of the price charged for whisky and seltzer at wayside inns.

The English Consul at Cadiz reports that a good automobile service running between Cadiz and Algeciras, for passengers and light merchandise, would very probably pay well. The road is bad at present, but means might be found for improving the whole route.

A non-stop race between London and Paris, called the "Entente Cordiale," is being promoted by a London firm of whiskey merchants and distillers. The object of the promoters is said to be to prove that, dosed with their brand of whiskey, the competitors will have the nerve necessary to accomplish virtual impossibilities in a hair-raising dash between the two capitals.

The British Motor Car Act of 1903, which came into operation on January 1, 1904, provides that persons convicted of a breach of its provisions, and who are fined sums exceeding twenty shillings shall have the right to appeal to Quarter Sessions. The Motor Union report that this right has been so far exercised in eight cases, with the result that the appeals have been allowed and the conviction quashed in six cases.

Charles J. Glidden, who recently offered a $2,000 cup for a reliability competition to the American Automobile Association, is the same gentleman who some years ago offered a one million dollar prize for the invention of a telephone repeater as practical as the telegraph repeater, and at a later date a prize of one half a million dollars for a perfect servant girl. Comparing these figures, it would appear that Mr. Glidden considers perfection in automobiles attainable at a lower price than perfection in telephone repeaters and servant girls.

International Cup Race Conditions.

The Racing Committee of the A. C. A. has given out the conditions governing entries for the International Cup Race of 1905. Entries close December 15, 1904, and must be made with the A. C. A. The entrance fee of $600 remains the same as in the conditions of last year, as do also the conditions concerning its return to the entrants and the selection of the competitors for the race. The following condition is, however, new: Each entrant shall file with the secretary of the club on or before April 15, 1905, an affidavit signed by two responsible persons, containing the following statements, based on their own knowledge:

1. That the car has been entirely completed for a period of over four weeks.
2. That they have driven the car over one thousand miles on the road.
3. That they have driven the car over two hundred and fifty miles without stopping the engine.
4. That they have driven the car more than forty miles in less than sixty minutes on track or road.

Vanderbilt Cup Race.

Chairman Pardington, of the Racing Board of the A. A. A., announces that entries for the Vanderbilt Cup Race will close absolutely on September 8th. All entries should be accompanied by a letter signed by the secretary of the club which the car is to represent. At the present time four entries have been declared, entry fees paid, and nominations made, viz.: White Sewing Machine Co., two cars; Panhard and Levassor, agents, two cars. It is expected that the Napier Co. will enter two cars, through S. F. Edge; correspondence is now being held with Mr. Edge to this effect.

Toronto Race Meet.

Automobile races were held at Exhibition Park, Toronto, on August 6th. Barney Oldfield was present, and, it is reported, lowered the world's record for three miles on a half-mile track, placing the figures at 3 min., 57 2-5 sec.

Six events were run off and proved interesting. W. A. Kemp acted as referee, J. B. Smith and A. E. Chatterson as judges, and Dr. Doolittle as starter.

Providence Race Meet.

Sept. 10th has been selected as the date for the annual race meet of the R. I. A. C. at Narragansett Park, Providence, R. I. Five events are scheduled, including a run for each of the three classes of gasoline cars, a race for steam cars and a "free-for-all" with no restrictions. Cash prizes of from $40 to $300 are offered. Entries close Sept. 8 with Secretary Elliot Flint, Crown Hotel, Providence, R. I.

e St. Louis Tour of the American Automobile Association.

Chicago to Pontiac.

: run from Chicago to Pontiac, Ill., a ce of 97 miles, was over dirt roads rly good condition, the noon stop be- oliet, fifty miles out of the Windy Forty-six cars made the start, twelve from Chicago and thirty-four from York and the East. Mr. Wallace, of urg, Pa., had not been heard from the time of the start, and was re- l as out of the run.

: confetti car when a few miles out icago met with engine trouble and a ired tire, and gave up the trip. The ts after this had to find their way as they could, asking directions from to town, and many of them lost their

: members of the Chicago A. C. who to have escorted the crowd to the ine did not put in an appearance. C. Farson was the only club member : start, and he followed the tourists ntiac on the train.

few miles out of Joliet the tourists held up by members of the automo- raternity of that city, who held up irs for half an hour until thirty or were in line, and then escorted them he city. Each tourist was given a ibbon badge, designating them as of the Joliet automobilists. Many party had lunch at Joliet, while some : cars pushed through without stop- The whole town was out to greet icoming cars. The first of the cars :d Pontiac shortly after 3 o'clock, and st straggled in at irregular intervals to at night, when forty-four cars were ered, Mr. Keely, 16 h. p. Rambler, a go starter, and Dr. Gifford, White er, still being out.

iday was a day of tire troubles and a many of the machines were tied up esult of this annoying difficulty. H. C. tyn had one rear tire go down five and finally ran into Pontiac on it fter all. A rear shoe blew out on the eerless Limousine. One of the Knox cars had three punctures. Sonnan- in the White steamer also had tire e. "Pop" Lowe bent his front axle e second time on the trip, his White er skidding into a deep galley. He ble to run into Pontiac, where the was straightened. The Buckmobile rouble with the transmission, the high clutch and gears heating up and g. The body was taken off at the ac garage and the car put in good

was reported that Mr. Breese had l through Pontiac at 11:35 A. M. ay, bound for St. Louis. D. B. Huss had a narrow escape from meeting with a bad accident. He ran over a large St. Bernard dog that had been chasing him, and killed it. His car tilted over dangerously, but luckily righted itself without doing any damage.

Harlan W. Whipple, whose Mercedes car had been tied up on several occasions, discovered at Chicago that his magneto was demagnetized. He had it magnetized again and reported a record run from Chicago to Pontiac in a little over four hours. Tom Fetch was stalled a few miles out of Pontiac by tire troubles. Another car took an extra shoe and inner tubes out to him and he was able to finish in good shape.

The people of Pontiac did the honors nobly, and entertained the tourists royally. The Phoenix Hotel was not large enough to accommodate the crowd, and the best homes in the city were thrown open and the tourists made welcome. The town was decorated with flags and bunting, and the arrival of the cars was made a gala occasion, business being practically suspended. A reception committee met the tourists at Dwight and escorted them into the city. Here the visitors registered at the Phoenix Hotel and were assigned to rooms there or with the various families of the town.

At 5 o'clock a large crowd gathered in front of the hotel, and Mayor S. A. Rathbun, of Pontiac, formally turned over the keys of the city to the autoists and welcomed them. In the evening the tourists were all invited out to the Chautauqua Assembly Grounds, where a two weeks' tenting encampment of the religious variety was in progress. There was music by the Pontiac Military Band followed by an address of welcome by the Hon. A. C. Morton, vice-president of the Chautauqua association. An entertainment was then given, after which short addresses were made by Augustus Post, Mr. Farson and others. The Vermilion Club, a social organization, held open house for the crowd.

Shortly after 11 o'clock most of the tourists had retired, as the great majority of them were to make early starts in the morning. Across the street in W. A. Copeland's garage a careless mechanic set the Oldsmobile of F. A. Benson on fire shortly after midnight, as reported in The Horseless Age last week. Most of the cars had been stored in a large shed about 200 feet from the garage, and after the blaze had been extinguished the owners of the cars refused to put them back into the garage and the machines were all left standing along the curb, a man being hired to watch them.

All the newspaper men were aroused and immediately started to get out reports for their papers. It was found, however, that the telegraph office was closed and the operator at the railroad station refused to handle the matter, being too busy.

The Crowd at Goshen, Ind.

The boys were stumped for a few minutes when Mr. Glidden came to their rescue. He said that he had once been a telegraph operator and would wire the matter. He went to the telegraph office, and securing permission to use the wire got all the matter off in record time like a veteran operator. He was cheered for his cleverness. The Horseless Age special report was the first matter sent over the wire.

James Waters, driving his Panhard car, was rather unnerved, and getting his chauffeur up started before 2 a. m. for Springfield, the confetti car going out a few minutes before him to mark the route.

It was 2 or 3 o'clock on Tuesday morning before the excitement subsided and the tourists went back to bed to get what little sleep they could before the hour for the morning start.

Pontiac to Springfield.

Tuesday morning dawned bright and clear, and some of the tourists were started toward Bloomington, the noon stop, before 6 o'clock. The confetti car was late in starting, and, being a low-powered runabout, was passed by about everything on the run. As a result, most of the big cars went out of their way, some of them straying around for fifteen to twenty miles before they were finally set straight, making the day's run over 125 miles. Later on, at the Leland, in Springfield, the tourists compared notes, and it was found that hardly two of them had come over the same route. Forty-eight cars left Pontiac for Springfield.

Coming into Springfield, a number of steep hills with deep sandy roadbed were met, and many of the tourists stalled their engines and had to get out and push. Previous to this time, the roads met with had all been in fair condition. There were few troubles during the day, except the straying from the proper course, for which Committeeman Mudd was largely responsible, he having agreed to furnish pilot cars from Chicago on and having failed to do so.

Charles J. Glidden's Napier car met with an accident which came near proving a serious one. While driving along a country road near Bloomington, he came upon a boy riding horseback. Mr. Glidden blew his horn, and the lad pulled the horse to one side of the road. As the car advanced, the animal became restive, and just as the Napier was alongside of it, the horse sprang in front of the machine. The auto was moving along at about ten miles an hour, and before Mr. Glidden could stop it, the car hit the horse. The animal was staggered, but not knocked down. A costly headlight on the Napier was smashed, the radiator dented, and a leaf in one of the front springs was broken, when Mr. Glidden jumped the car into a shallow ditch in hopes of preventing the accident. It took three-quarters of an hour to repair the damage.

A large crowd gathered at the Leland House to greet the arriving tourists, and cheered them as they came in. The local automobilists offered the hospitality of their homes, but the majority of the tourists stuck close to the hotel and prepared to turn in early and rest up for the last day's run to St. Louis and the end of the tour.

The Pope-Toledo car did not stop at Springfield, going forty miles down the road toward St. Louis to the home of some friend of Mr. Pope, from where they continued toward St. Louis Wednesday morning. This action on their part occasioned considerable comment around the Leland House, it being inferred that this course had been taken in order that the Pope car might be first into St. Louis. Many of the tourists were very eager to achieve this distinction, and many left late Tuesday night and very early Wednesday morning for the Fair City.

As a result of the fire at Pontiac, special firemen with fire extinguishers were stationed at all the garages, and remained on duty from the time the autos arrived until they got away again. The visitors were entertained at the Sagamo Club on Tuesday evening, a local committee, headed by Dr. John A. Prince, having the affair in charge.

A telephone message was received by the Chief of Police at Springfield Tuesday night from a farmer, requesting that he hold the members of the automobile party there, as while passing his house, twenty miles out of the city, a machine had frightened one of his horses so badly that it died. He gave his name as Snyder, but was unable to state the number of the car he believed was responsible for the damage done.

The roads between Springfield and St. Louis were reported in fair condition, but despite this the majority of the tourists decided upon a 5:30 or 6 o'clock start Wednesday morning, and it was well they did. As early as 5 o'clock many of the tourists were under way on the last day's run of the greatest of automobile tours. The confetti car, manned by Harry F. Loper, of Springfield, and H. C. Beyers, of the St. Louis A. C., started out to mark the roads at an early hour. By 8:30 every car had left the Leland and was on the road.

Mr. Meyers' Winton Overturned near Valparaiso, Ind.

Springfield to St. Louis.

An endurance contest in every sense of the word was the last day's run of the St. Louis tourists from Springfield, Ill., to their destination at the Fair City. The entire distance was 105 miles on the route card. The last forty miles of this was through mud from six inches to a foot deep, and over roads in comparison with which a ploughed field was a parlor floor. Springs, wheels and machinery were tested as severely as possible, and they stood the test nobly for the greater part, although here and there a wabbly front wheel or a bent rear axle told of the weakening effect of the hard knocks received in the 1,200 or more miles from New York City, and particularly on this last stage. What was undoubtedly the most remarkable run of the day was accomplished by Tom Fetch in Packard, No. 13. This car made the trip in five hours and fifty minutes, the best running time recorded, and despite the heavy roads and steep hills only engaged the hill climbing gear once.

The roads were in fairly good condition until Litchfield, the noon stop, was reached. It was learned that there had been a small cloudburst early Wednesday morning, and this accounted for the fierce road conditions, equal to those met with on the Pittsburg endurance contest last fall. It was a terrible strain on both drivers and machines, and all were heartily glad when it was finished.

The first arrival at St. Louis was James L. Breese, of New York, in his Mercedes car. He had gone ahead of the other tourists and forfeited his certificate. Second came the big Pope-Toledo, with George Soules driving. The Popes had decided to disobey the rules of the Tour Committee, and on Tuesday went forty miles beyond the night control at Springfield, Ill. A. L. Pope arranged to have one of the party return by train to sign the official register at the Leland Hotel, but a number of the tourists made a protest against this, and Mr. Pope openly stated that he

not care anything about the certificate, intended to score the newspaper head at St. Louis.

ie car was driven on to the Fair City, ing late Tuesday night. On Wednes- morning a special permit was secured the machine was driven around the ld's Fair Grounds. It then returned, was made ready for the parade with other tourists.

n route to St. Louis, the drivers of of the cars were obliged to wind their wheels with ropes and chains, in or- to get sufficient traction to pull through mud. The big touring cars were often k in places where the runabouts got ugh all right. The performance of the 6 h. p. Covert, which had been named Baby," proved this. The little car a number of machines into St. Louis h had double and three times as much er.

B. Huss, in the Olds tonneau, was ied, and after forty-five minutes' hard k with his engine and a fence rail, man- to get out of the hole and back on road again. Most of the cars had to the thirty or more miles of greasy on their low gears, and this, of course, ed their motors badly. The Franklin cooled car went through in good shape, only hold-up resulting from a broken ing chain.

re troubles were numerous. Percy ce in the Pierce-Arrow, the Covert bout, the Knox Tudor and others ex- encing them.

ie St. Louis car sent out to distribute etti ran out of gasoline forty miles St. Louis. It also bent a front axle y by dropping into a deep rut. Other on the run having front and rear axles or sprained were Gillette's Pope- tford, the Royal Tourist, the Haynes- erson and George H. Lowe's White ner.

few miles out of Springfield Mr. nehart, driving the Yale 16 h. p. car, stalled by a steering knuckle break- He jacked the car up, took the part and drove back to Springfield with a ner to have it fixed, returning later, after putting on the front wheel he taken off, continuing toward St. Louis. arlan W. Whipple, who has been hav- all sorts of trouble with his Mercedes went down and out in a small town it fifteen miles from St. Louis. His n shaft broke. Mr. Whipple left the with his man and came on to the fin- ng point by train. The machine will be ed into St. Louis and shipped to Bos- for repairs. A large Panhard car h brought a party out to meet the tour- was also stalled, having broken a crank t, and had to be towed back to St. is.

rrangements had been made by local mobilists at Edwardsville, the noon stop, to entertain the tourists, but nearly all of them passed through the town without stopping, and the committee appointed to greet them was disappointed. Dr. E. M. Senseney, Vice-president of the St. Louis A. C., and his son, Eugene, also J. W. Bemes, W. W. Gardner, A. Fehring, H. S. Turner, L. Benoist, E. C. Lackland, Jr., and W. S. Pope, Jr., drove out from St. Louis in cars to meet the tourists at Edwardsville. Windsor T. White also took a party out in a White car.

PEERLESS LIMOUSINE AT JACKSON PARK, CHICAGO.

W. B. Hurlburt, in his Cadillac machine, was the first of the tourists to reach the finishing point at the Eads bridge, in East St. Louis. Mr. Tucker and Mr. Downs, of the A. A. A., were on hand to greet him, as were several members of the St. Louis A. C. in their machines, and a large crowd of interested spectators. The camera fiends and reporters were greatly in evidence. Mr. Hurlburt was cheered as he came up, and was highly elated over the success of his machine. He was closely followed by Webb Jay, Augustus Post, Tom Fetch, Esselstyn, Johnston and the others who had made the start from Springfield. The Covert motorette, "The Baby" of the run, was loudly cheered as it came in.

All the cars were backed up against the curb in front of the City Hall, and obliged to wait until 4 o'clock in the afternoon for the arrival of the others. It was before noon when Hurlburt arrived, he having made an exceedingly early morning start from Springfield.

The men and ladies in the various cars put in the time as best they could, cheering every car as it arrived. All the machines were mud-covered and plastered, and showed plainly the hard work they had done on the greasy Illinois roads. The crowd was interested in reading the signs on the machines, which stated where they had started from, most of them being labeled New York to St. Louis, or Boston to St. Louis, as the case might me.

Promptly at 4 o'clock the cars were lined up in the numerical order of their entry, and started toward St. Louis. All were held up to pay toll at the gate there, and then the Mississippi River was crossed. It was but a short run to the official headquarters at the Hotel Jefferson, and a few minutes after 4 o'clock the cars pulled up there and finished the longest organized automobile tour the world has ever seen.

The usual crowd gathered around and asked all sorts of questions, but the men and women in the cars did not stop to answer them, as all were tired and wholly happy that they had reached their destination, and wanted a chance to clean up and forget all about automobiles, for a time at least.

Headed by an automobile occupied by Mayor Silas Cook, of East St. Louis, the tourists continued over the Eads Bridge and toward the Jefferson Hotel. Much delay was caused in forming the line, on account of the large number of machines crowded in the narrow street in front of the City Hall. Large numbers of people jammed the sidewalks along the whole length of the west side approaches, and the girders of the long bridge over the Mississippi were lined with men and boys who had climbed up in them to get a view of the cars as they made their triumphal entry into the Fair City.

Near the eastern approach of the bridge one of the St. Louis cars collided with a coal wagon and delayed the parade slightly. On the viaduct another of the escort

cars was obliged to stop, owing to ignition troubles. Tom Fetch, in his Packard, was obliged to drop out of line, his batteries short-circuiting. He was stalled until five new dry cells could be secured, and then continued into St. Louis. Chairman Post ran out of gasoline, and had to drop out of line. A negro bicyclist was knocked over but not badly hurt, and there were several minor accidents caused by the crush of traffic.

The procession, over the National Highway, although a small one, was on time and beat the eastern tourists in. It consisted of the following:

Hart B. Newman, of New Orleans (White), Baltimore to St. Louis; Sam Stone, Jr., New Orleans (White), Baltimore to St. Louis; G. Douglas Neare, Cincinnati (St. Louis), Cincinnati to St. Louis; W. B. Saunders, Philadelphia (Winton touring car), Philadelphia to St. Louis; Guy Stone, New Orleans (Rambler touring car), Cincinnati to St. Louis; A. M. Husted, Uniontown, Pa. (White), Uniontown to St. Louis; J. F. Stone, Columbus, Ohio (Buckeye), Columbus to St. Louis; Marion Motor Car Co., Indianapolis (Marion), Indianapolis to St. Louis; C. O. Howard, Columbus, Ohio (Special), Columbus to St. Louis; Thomas Pitcher, Columbus, Ohio (Special), Columbus to St. Louis; Dr. H. C. Wendel, Cincinnati, Ohio (Pope-Toledo), Cincinnati to St. Louis.

Car No. 16, entered by William Moneypenny, Jr., of Columbus, Ohio, a member of the A. A. A. Touring Committee, went as far as Indianapolis, where Mr. Moneypenny received a message to the effect that his daughter was seriously ill, and turned back at once, abandoning the trip. He drove a Stearns 24 h. p. and was carrying four passengers and a chauffeur.

The men who had come over the National Highway route had met with bad road conditions and experienced many hardships. Hart D. Newman and Sam Stone, who came over the route from Baltimore, had pictures showing big logs tied to the rear of their cars and dragging by ropes to hold them back on some of the hills encountered, which were most dangerous. Mr. Newman, despite all difficulties met, was the first to reach St. Louis over the route. Before he started the White Sewing Machine Co. offered him the services of a factory expert as chauffeur, but he had refused the offer, deciding to put the car through alone and unassisted.

They also struck roads mud covered and heavily rutted, which were both difficult and troublesome to negotiate. The trip altogether was a most severe one and had caused them to change their minds about returning over the same route in their machines.

THE KANSAS CITY DIVISION.

Cars 96 and 97 had a hard run, the former covering 365 miles from Pittsburg, Kan., to St. Louis, and the latter 335 miles from Kansas City to St. Louis. They had met with hard roads and bad conditions throughout. No. 96 was driven by C. C. Cocherell, of Pittsburg, Kan., and is a 7 h. p. Stevens-Duryea. No. 97 is of the same make and carried E. P. Moriarity and Roy Sanburn from Kansas City to St. Louis. These were the only two cars coming through from the far West. Neither experienced any serious breakdowns or accidents.

At St. Louis.

A committee of the members of the St. Louis A. C. were on hand and greeted the tourists, doing everything in their power to make things comfortable for them. In the evening at the Jefferson all the tourists signed the official registry list, so that the records might be completed and the certificates awarded. Invitations were also given out for a smoker to be held at the Hotel Washington Thursday evening, to which all the tourists were invited. A ladies' reception is also to be held in connection with this. The St. Louis A. C. will hold open house as long as the tourists remain in the city.

Sonnanstine, driving one of the White steamers, did not reach St. Louis on Wednesday night, but came limping in on Thursday, accompanied by mechanic Joslyn. The car had experienced trouble with its thermostat, and had been delayed for hours. Sonnanstine was exhausted, and would have given up the attempt to reach the finish had it not been that Joslyn held him to the task and later drove the car while Sonnanstine slept. A report had been received at the Jefferson to the effect that the car had exploded its gasoline tank, wrecking the machine and injuring the two men. This caused considerable of a stir among the tourists, all of which were greatly relieved when positive information was received disproving the rumor.

Dr. Gifford, also driving a White steamer, did not reach St. Louis Wednesday night, but managed to get in on Thursday in good shape. Car No. 52 entered by A. F. Keeley, of Royersford, Pa., had not as yet arrived when the run into St. Louis was made. The last report received stated that he had reached Pontiac, Ill., and was on his way to Springfield and thence to St. Louis.

The crowd spent Thursday around the hotel swapping stories of road experiences, and many wonderful tales were related. Many made the trip out to the World's Fair grounds in their machines or on the cars, and took in the big show. Charles J. Glidden completed arrangements to have his big Napier car, in which he is touring the world, placed on exhibition for two weeks in the Transportation building.

The smoker at the Washington Club proved to be a most enjoyable affair. Addresses were made by prominent members of the A. A. A. and others present. Mayor Wells and other dignitaries attended. The reception to the ladies of the party also proved to be most enjoyable. The vote of thanks of the tourists was extended to A. B. Tucker and M. L. Downs for the most excellent manner in which they had conducted the tour, and made hotel and other arrangements en route. A purse was started among the tourists, and Messrs. Tucker and Downs will be given a substantial reminder of their gratitude.

H. P. Dyer, of Cleveland, Ohio, driving a Winton quad, left on Thursday for his home, going over the National Highway. A number of other tourists also left, the touring committee revoking their announcement that no one would be given a certificate who did not participate in the parade on Friday.

A meeting of the Tour Committee of the A. A. A. was held at the Jefferson on Tuesday evening, and it was decided to have a committee composed of officials of the Association call on Mayor Wells of St. Louis at the City Hall at 2 o'clock Thursday afternoon, and formally announce the completion of the tour and receive the official welcome to St. Louis. The following were named on the committee: President Harlan W. Whipple, Augustus Post, A. B. Tucker, A. L. Pope and A. B. Lambert, President of the St. Louis A. C. A number of other tourists accompanied the committee and were given a hearty welcome by Mayor Wells. They presented to him the greetings sent through President Whipple by Gov. Odell of New York, and the Mayors of cities passed through by the tourists.

Mr. and Mrs. T. C. Collings, of Cleveland, driving in their Peerless touring car, it developed before the end of the run, were on their honeymoon trip, having been married but a few days before the tour started. Congratulations were in order and were heartily given when the news became generally known.

Following is a general summary of the tour:

Actual number of entries, 108; number of starters, 70; number of cars that arrived at St. Louis, 58; number of persons completing the run, 288; longest route, Boston to St. Louis; length of longest route, 1,264 miles; start, July 25; finish, August 10; days en route, 17; actual days of running, 14-15.

The fifty-eight cars having successfully completed the run from the points they were started from, were registered

officially at the Jefferson Hotel Thursday morning, and have qualified for certificates if they have not violated any of the touring committee's rules. The certificates were issued to the tourists on Thursday. They were handsomely engrossed on heavy bond paper, and read as follows:

American Automobile Association
St. Louis Tour
July 28 to August 10, 1904.

This to certify that ...., a qualified entrant, has toured on his .... H. P. .... automobile from .... to St. Louis, Mo., U. S. A., duly registered at all night stops in accordance with the regulations of the tour. Attest:

Harlan W. Whipple,
President.

C. H. Gillette,
Secretary.
(Seal.) Augustus Post,
Chairman Touring Committee.

TIRES IN THE RUN.

Tires are ever an interesting and important consideration in connection with automobiles, as it is their weaknesses that lend that delightful uncertainty to the sport. On the run to St. Louis tire troubles were confined to a remarkably few punctures, and some cars actually finished at St. Louis with the same air in them with which they started at New York and Boston—a truly remarkable showing. The following tire information is consequently interesting.

On the cars covering the Maine Line route, with which representatives of all the tire companies traveled, there were 178 tires in all. Of these 35 were G. & J., 47 Diamond, 59 Goodrich, 4 Swinehart, 16 Fisk, 5 Michelin, 8 Continental, 4 Dunlop, 4 English Dunlop, 5 Hartford, 1 International.

Automobile Day at the Fair.

Friday was automobile day at the Fair, and proved the greatest demonstration of horseless vehicles ever held. Over 300 machines were in line, under the charge of Chief Williard A. Smith, of the Department of Transportation, and L. L. Fest, superintendent of the Automobile & Vehicle section of the Fair. Permits were issued for each car, giving them free entrance into the Fair grounds. The city government suspended their license regulations for a few days, and the tourists were given the freedom of the city. They were also given a place of honor in the line, and were loudly cheered by the thousands who witnessed the procession pass through the various streets of the city and the Fair grounds. Many of the cars were handsomely decorated.

The procession headed by the new police car and a detachment of mounted police officers left the Jefferson Hotel at 1:30 and reached the Fair grounds at 2:30. At the entrance to the grounds the band was awaiting it in transit automobiles and lead the parade. The line of march in the grounds was very elaborate, and it was the longest that has ever traversed the Exposition grounds. It was as follows:

From the States entrance the parade passed along Commonwealth avenue to Constitution avenue, circling to the west of the Montana and Michigan buildings, thence north to the Government terrace, where it turned to the west to follow the broad road in front of the palace of Fine Arts, south of the terrace of States, turning north at the West pavilion to enter the main picture along the east front of the palace of Machinery and west

Arrival of Tourists at East St. Louis, Prior to Crossing the Eads Bridge.

Official Entry Number	Car Entered	Rated Horse Power	Motive Power	Reference Data New York to St. Louis Run. Type of Engine	Pas'ng'rs Car'ied	Chauffeur	Car Entered by	Starts from	Route to be followed	Record.
1	Mercedes...........	20-27	Gasoline	4 cylinder upright in front		Yes	H. W. Whipple, Andover, Mass.	Boston	New England and Main Line.	Disabled in last stage.
2	Apperson Car.....	60	"	4 cylinder upright in front	5	Yes	John Farson, Chicago	Chicago	Main Line.	Finished at St. Louis.
3	Pope-Hartford	10	"	Single cylinder under body	1	No	C. H. Gillette, N. Y. City	New York	Main Line.	Finished at St. Louis.
4	White Steamer . ..	10	Steam	Compound engine in front		Yes	W. T. White, Cleveland	New York	Main Line.	Did not start.
5	White Steamer.....	10	"	Compound engine in front		Yes	Elliot C. Lee, Boston	Boston to Buffalo	New England and Main Line.	Gave up before Albany.
6	Franklin	10	Gasoline	4 cylinder in front		No	A. R. Pardington, Brooklyn	New York to Albany	Main Line.	Did not start.
7	Stanley Steam Car.	6	Steam	Com. engine under body	2	No	Dr. J. A. Chase, Pawtucket, R. I.	Providence to Albany	New England and Main Line.	Stopped at Albany.
8	Knox Runabout....	8	Gasoline	Horizontal single cylinder, air cooled under body	2	No	Dr. W. E. Milbank, Albany	Albany to Buffalo	Main Line.	Did not start.
9	Peerless............	24	"	4 cylinder upright in front	2	No	R. H. Johnston, N. Y. City	Cleveland	Main Line.	Finished at St. Louis.
10	White Steamer.....	10	Steam	Compound engine in front		Yes	Augustus Post, N. Y. City	New York	Main Line.	Finished at St. Louis.
11	Austin	50	Gasoline	4 cylinder horizontal	5	Yes	Frank X. Mudd, Chicago	Chicago to St. Louis	Main Line.	Finished at St. Louis.
12	Pierce Great Arrow	24	"	4 cylinder in front	4	Yes	W. C. Temple, Pittsburgh	Pittsburgh to St. Louis	Main Line.	Finished at St. Louis.
13	Packard............	24	"	4 cylinder upright in front	2	No	E. T. Fetch, Detroit	Erie	Main Line.	Finished at St. Louis.
14	Peerless	70	"	4 cylinder upright in front	6	Yes	R. P. Scott, Baltimore	New York	Main Line.	Wrecked by train at Perrysburg, O.
15	Napier.........	24	"	4 cylinder upright in front	4	Yes	C. J. Glidden, Boston	Boston	Main Line.	Finished at St. Louis.
16	Stearns....	24	"	Double cylinder opposed under body	4	Yes	Wm. Monypeny, Jr., Columbus, O.	Columbus	Nat'l Highway.	Turned back at Indianapolis.
17	Car name not given with entry....						H. W. Smith, Syracuse	Syracuse	Main Line.	Did not start.
18	White Steamer.....	10	Steam	Compound engine in front			Geo. S. Waite, Cleveland	Cleveland	Main Line.	Finished at St. Louis.
19	Mercedes	40	Gasoline	4 cylinder upright in front			J. L. Breese,	Buffalo	Main Line.	Finished at St. Louis.
20	Pope-Toledo	24	"	4 cylinder upright in front	4	Yes	F. C. Donald, Chicago	Chicago	Main Line.	Finished at St. Louis.
21	Pope-Toledo	24	"	4 cylinder upright in front	5	Yes	H. Fred'k Lesh,	Boston	Main Line.	Finished at St. Louis.
22	Rambler	16	"	Double cylinder opposed under body	4	Yes	Thos. B. Jeffery & Co., Kenosha, Wis.	Kenosha, Wis.	Main Line.	Did not start.
23	Mercedes		"	4 cylinder upright	5	Yes	A. J. Wells, Akron, O.	New York	Main Line.	Did not start.
24	Haynes-Apperson .	12	"	Double cylinder opposed under body	2	No	Haynes-Apperson Co., Kokomo, Ind.	New York	Main Line.	Did not start.
25	White Steamer.....	10	Steam	Compound engine in front	1	No	H. D. Newman, New Orleans	Baltimore	Nat'l Highway.	Finished at St. Louis.
26	White Steamer.....	10	"	Compound engine in front	1	No	Sam Stone, Jr., New Orleans	Baltimore	Nat'l Highway.	Finished at St. Louis.
27	De Dietrich	30	Gasoline	4 cylinder upright in front		Yes	R. R. Sheldon, Boston	Boston	Main Line.	Finished at St. Louis.
28	Franklin...........	16	"	4 cylinder upright in front	2	No	Dr. R. E. Rolfe, Boston	Boston	Main Line.	Did not start.
29	White Steamer.....	10	Steam	Compound engine in front	3	Yes	P. H. Deming, N. Y. City	New York	Main Line.	Did not start.
30	White Steamer....	10	"	Compound engine in front	3	Yes	Geo. H. Lowe, Boston	Boston	Main Line.	Finished at St. Louis.
31	White Steamer.....	10	"	Compound engine in front			Ray D. Lillibridge, N. Y. City	New York	Main Line.	Finished a day late.
32	White Steamer.....	10	"	Compound engine in front		Yes	Webb Jay, Cleveland	New York	Main Line.	Finished at St. Louis.
33	Knox	16	Gasoline	Double cylinder opposed front	3	Yes	C. Eugene Hale, N. Y. City	New York	Main Line.	Did not start.
34	Elmore.............	10	"	2 cycle engine under body	3	No	P. F. Megargle, Rochester	New York	St. Louis.	Finished at St. Louis.
35	White Steamer.....	10	Steam	Compound engine in front	2	No	Dr. W. H. Gifford, Cleveland	Cleveland	Main Line.	Finished at St. Louis.
36	Franklin...........	10	Gasoline	4 cylinder engine in front	2	No	C. P. Wilson, Boston	Boston	Main Line.	Did not start.
37	Pope-Toledo.......	24	"	4 cylinder engine in front	3	Yes	A. R. Pendleton, St. Louis	New York	Main Line.	Did not start.
38	Cadillac.......	8-½	"	Single cylinder horizontal under body	4	Yes	W. E. Metzger, Detroit	New York	Main Line.	Finished at St. Louis.
39	Columbia	24	"	4 cylinder engine in front	4		F. N. Manross, Forestville, Ct.	Bristol, Ct.	New England and Main Line.	Finished at St. Louis.
40	Rambler	7	"	Single cylinder horizontal under body	2	No	E. H. Wallace, Freeport, Pa.	Pittsburgh	Nat'l Highway.	Broke connecting rod and quit.
41	Matheson	24	"	4 cylinder in front	3		Matheson Motor Car Co., Ltd., Holyoke, Mass.	Springfield	New England and Main Line	Did not start.
42	Darracq	15-20	"	4 cylinder in front	3	Yes	F. A. LaRoche, N. Y. City	New York	Main Line.	Made special schedule.
43	St. Louis	10	"	Double cylinder in front	2	No	G. D. Neare, Cincinnati	Cincinnati	Nat'l Highway.	Finished at St. Louis.
44	Cadillac............	8½	"	Single cylinder horizontal under body			John K. Lest, Wheeling, W. Va.	Wheeling, West Va.	Nat'l Highway.	Did not start.
45	Autocar	12-½	"	Double cylinder opposed in front	2	No	Dr. Wm. J. Morton, N. Y. City	New York	Main Line.	Did not start.
46	Pakard	22	"	4 cylinder in front		Yes	Geo. O. Draper, Hopedale, Mass.	Worcester to Albany	New England Route.	Stopped at Albany.
47	Franklin	10	"	4 cylinder in front, air cooled			H. H. Franklin Mfg. Co., Syracuse	New York	Main Line.	Finished at St. Louis.
48	Winton	20	"	Double cylinder opposed under body	3	Yes	W. B. Saunders, Philadelphia	Philadelphia	Phila., Pittsburgh and National Highway Routes from Boston.	Finished at St. Louis.
49	Buffum.............	28-32	"	4 cylinder in front	5	Yes	F. R. Tibbets, Boston	Buffalo to Chicago	Main Line and New England.	Did not start.

50	Panhard..........	24	"	4 cylinder in front	2	Yes	Jas. M. Waters, N. Y. City	New York	Main Line.	Finished at St. Louis.
51	Pierce Great Arrow	24	"	4 cylinder in front		Yes	Percy P. Pierce, Buffalo	Boston	Main Line.	Finished at St. Louis.
52	Rambler...........	7	"	Single cylinder horizontal under body	3	No	A. T. Keely, Rogers Ford, Pa.	Rogers Ford	Nat'l Highway.	Finished at St. Louis.
53	Olds Tonneau......	7	"	Single cylinder horizontal under body.	2	No	E. J. Spooner, N. Y. City	New York	Main Line.	Finished at St. Louis.
54	Winton............	20	"	Double cylinder opposed under body	2	No	Fred C. Gates, Cleveland	Cleveland	Main Line.	Finished at St. Louis.
55	Pope-Hartford.....	10	"	Single cylinder horizontal under body	2	No	Harold L. Pope, Hartford, Ct.	Springfield, Mass.	Main Line.	Finished at St. Louis.
56	Panhard	16-20	"	4 cylinder in front	5	Yes	S. D. Malpas, N. Y. City	New York	Main Line.	Stopped at Albany.
57	Rambler	16	"	Double cylinder opposed under body	1	No	Guy Stone, Cincinnati	Cincinnati	Nat'l Highway.	Finished at St. Louis.
58	Yale..............	16	"	Double cylinder opposed under body	3	No	Swinehart Clincher Tire & Rubber Co.	New York	Main Line.	Finished a day late; dropped out at Albany and restarted at Toledo.
59	Pope-Toledo.......	24	"	4 cylinder in front	4	Yes	A. L. Pope, N. Y. City	New York	Main Line.	Finished at St. Louis.
60	Buckmobile........	15	"	Double cylinder upright under body	2	No	Black Diamond Auto Co.	New York to Chicago	Main Line.	Finished at St. Louis.
61	Royal Tourist......	20	"	4 cylinder opposed in front	2	Yes	Royal Motor Car Co.	New York	Main Line.	Finished at St. Louis.
62	White............	10	Steam	Compound engine in front	4	Yes	H. J. Hellman,	Chicago	Main Line.	Did not start.
63	Winton...........	20	Gas	Double cylinder opposed under body		Yes	S. S. Gorham, Chicago	Chicago	Main Line	Did not start.
64	Covert............	6	Gasoline	Single cylinder upright in front	2	No	Harold Hoag, Lockport, N. Y.	Buffalo	Main Line	Finished at St. Louis.
65	Winton............	20	"	Double opposed under body	3	No	H. P. Dyer, Cleveland	Cleveland	Main Line	Finished at St. Louis.
66	White.............	10	Steam	Comp. engine in front	3	No	A. M. Husted, Uniontown, Pa.	Uniontown	Main Line	Finished at St. Louis.
67	Peerless..........	24	Gasoline	4 cylinder upright in front	3	Yes	W. C. Lloyd, Chicago	Chicago	Main Line	Did not start.
68	Stearns...........	24	"	Double opposed under body	4	Yes	J. V. Edgerton, Chicago	Chicago	Main Line	Did not start.
69	Apperson..........	40	"	4 cylinder upright in front	2	No	Jerome A. Ellis, Chicago	Chicago	Main Line	Did not start.
70	Knox..............	16	"	Double opposed under body	3	No	S. J. Turnblad, Minneapolis	Minneapolis	Main Line	Finished at St. Louis.
71	Austin............	16	"	Double opposed under body	4	No	Chas. B. Judd, Grand Rapids	Grand Rapids	Main Line	Finished at St. Louis.
72	Autocar...........	12	"	Double opposed in front	3	Yes	F. H. Pitsch, Chicago	Chicago	Main Line	Finished at St. Louis.
73	Pope-Toledo.......	24	"	4 cylinder upright in front	2	Yes	W. W. Shaw, Chicago	Chicago	Main Line	Did not start.
74	Knox..............	16	"	Double opposed under body	2	No	G. J. Sherer, Minneapolis	Minneapolis	Main Line	Did not finish.
75	Marion............	16	"	4 cylinder, air cooled in front	2	Yes	Marion Motor Car Co., Ind'p's	Indianapolis	Nat'l Highway	Finished at St. Louis.
77	Phelps		"	3 Cylinder upright in front	2	Yes	F. W. Richards, Boston	Boston	N. Engl. and Main Line	Stopped at Buffalo.
78	Winton............	20	"	Double opposed under body	3	Yes	L. A. Wood, St. Paul	St. Paul	Main Line	Did not start.
79	Rambler...........	16	"	Double opposed under body	4	No	B. A. Ledy, St. Paul	St. Paul	Main Line	Did not start.
81	Pope-Toledo.......	24	"	4 cylinder upright in front	3	No	T. E. Allison, Wallingford, Pa.	Philadelphia	Nat'l Highway	Did not start.
86	Oldsmobile........	7	"	Single cylinder horiz. under body	2	No	W. J. Wilkins, Chicago	Chicago	Main Line	Did not start.
87	Winton............	20	"	Double opposed under body	5	No	G. T. Thompson, Onondaga, N. Y.	Rochester	Main Line	Quit at Cleveland.
88	Franklin..........	10	"	4 cylinder upright in front	3	Yes	R. P. Lipe, Toledo	Toledo	Main Line	Did not start.
89	Buckeye...........	20	"		3	Yes	Oscar Lear Auto Co., Columbus, O.	Columbus	Nat'l Highway	Finished at St. Louis.
90	Special...........	10	"		4	Yes	Rodgers & Co., Columbus, O.	Columbus	Nat'l Highway	Finished at St. Louis.
96	Stevens-Duryea....	7	"	Doub. cylinder opposed in body	2	No	C. C. Cockerill, Pittsburg, Kan.	Pittsburg		Finished at St. Louis.
97	Stevens-Duryea....	7	"	Doub. cylinder opposed in body.	2	No	E. P. Moriarity, Kansas City	Kansas City		Finished at St. Louis.
101	Pope-Toledo.......	24	"	4 cylinder upright in front	3	No	W. R. Smith, Chicago	Chicago	Main Line	Finished at St. Louis.
102	Pope-Toledo.......	24	"	4 cylinder upright in front	4	Yes	O. F. Weber,	Milwaukee	Milwaukee to St. Louis	Finished at St. Louis.
103	Pope-Toledo.......	24	"	4 Cylinder vertical in front	2	No	Dr. H. C. Wendel, Cincinnati	Cincinnati	Nat'l Highway	Finished at St. Louis.
104	Winton............	20	"	Double opposed under body	2	No	J. R. Blakeslee Jr., Cleveland	Cleveland	Main Line	Finished at St. Louis.
105	Peerless..........	24	"	4 cylinder upright in front	2	No	Mr. Collings, Cleveland	Cleveland	Main Line	Finished at St. Louis.
107	Franklin..........	10	"				Ralph Temple	Chicago	Main Line	Finished at St. Louis.
112	Searchmont........	12	"		2	No	E. R. Hibbard	Chicago	Main Line	Finished at St. Louis.
115	Special...........	20	"		4	No	Geo. A. Crane	Chicago	Main Line	Finished at St. Louis.
116	Oldsmobile........	10	"			No	Mr. Benson	Chicago	Main Line	Destroyed by fire at Pontiac.
117	(?)						Mr. Meyers	Chicago	Main Line	Finished at St. Louis.
120	Cannon............	18	"		2	No	D. C. Olin	Kalamazoo	Main Line	Finished at St. Louis.
121	Rambler...........	16	"		3	es	R. Hauslein	Chicago	Main Line	Finished at St. Louis.

on the south side of Louisiana way to the Grand Trianon, north on University boulevard to Olympian way west to International avenue to the Administration terrace, east on Administration avenue to the Palace of Transportation, and south along the west front of this building to the north side of Louisiana way to the plaza of St. Louis, where it circled the palace of Varied Industries to enter Administration avenue, whence it proceeded west to the west entrance of The Pike. Returning east through The Pike, it crossed the plaza of St. Louis and passed the west front of the palace of Manufactures, entered eastward on the Louisiana way, circled the palace of Mines and Metallurgy and crossed Government Terrace before the west front of the Government building.

After the parade had ended the greater number of the tourists made arrangements to ship their cars home by train. Mr. Dyer, driving a Winton Quad went back

over the roads to Indianapolis. Several others will return by the National Highway route, including Augustus Post, James M. Waters and the Mergargel boys, who successfully completed their second trip to St. Louis and return in their doughty little Elmore car in which they have averaged over fifty miles a day for the last three months. Saturday morning found most of the tourists started for home, and the A. A. A. tour a pleasant memory of the past.

A Review of the Tour.

By Harry B. Haines.

The St. Louis tour of the American Automobile Association has taught the American public a great lesson, for it has demonstrated to them beyond the possibility of a doubt that the cars built in this country can stand side by side with their foreign competitors, can cover the same distance in the same time and over the same roads, and stand open for comparison without fear of getting any the worst of it. There were four foreign cars entered in the run, a Napier, a Panhard and two Mercedes. Three of these finished. Of the fifty or more American cars which started, but four failed to reach their intended destination, as a result of actual breakdowns. It was a truly wonderful showing and highly indicative of the fact that the automobile of to-day is no longer a playtoy, but a reliable, trustworthy vehicle, worthy of consideration as a business proposition, and deserving of investment as an up-to-date mode of transportation.

The great improvement in car construction over even the machines that went to Pittsburg last year was plainly evident. The cars proved to have the stability necessary for use over the varying and none too smooth American roads. A liberal use of lock nuts and washers prevented the usual loss of parts en route, and the roads were not as liberally strewn with bolts, nuts and other parts as they have been in runs of the past.

The tour was a triumph for the light car, as has been every run held in America. As usual, the machines of 2,000 pounds or under ran away from the heavier cars of much greater horse power. It was easily to be seen that the ideal touring car is in the 2,000 pound class and should have a motor developing not less than one actual horse power for every hundred pounds of weight carried. A car so designed and equipped will negotiate any roads met in the United States with a continual surplus of power, and will average twenty miles an hour up hill and down, under ordinary conditions.

Parade Through Jefferson Park, St. Louis.

The idea of equipping touring cars with only two speeds forward was demonstrated to be a wrong one,. A car so fitted is undesirable, no matter what its horse power may be, for often roads are met where the engine will not pull the car on the high speed, and yet has not enough work on the low speed. An intermediate gear in touring work should be as essential to a car as its gasoline tank.

The lack of ignition troubles on the big jaunt half across the country proved conclusively that American manufacturers have given to the ignition apparatus that attention which it exacts and deserves. There were a dozen or more cars that claimed to have made the trip from the East to St. Louis without their engines skipping spark, and without even looking at the ignition plugs and system—a great showing when the fact is considered that less than two years ago the ignition troubles were the big bugaboo of American cars. The water circulation and radiating systems have been greatly improved, and the old and unreliable chain driven pumps have given away to gear driven ones which keep the water in constant motion as long as the engine runs. One of the Pope-Toledo cars is claimed not to have taken a drop of water on the entire run from New York, having the same supply at St. Louis as when it started.

Taken altogether the run was a great event, intelligently conducted and successfully completed. It has demonstrated not only to the American public, but to the whole world that although the roads in the United States are not the best, our automobiles run steadily, reliably and strongly over them, and can hold their own with any product in the world.

The desire on the part of some of the manufacturers to start at unreasonable hours and make the tour a race was most regrettable, but it seemed could not be prevented. Cheap advertising is an inducement that some men can't resist.

In conclusion, it may be said that the run was all that could be desired, but it gave many of the entrants their fill of touring, and it may be that the A. A. A. or any other organization will experience difficulty in getting together again a combination of manufacturers and private owner entrants. The combination doesn't mix well.

THE MARKING OF ROADS.

There was general comment among the tourists at the Jefferson to the effect that the route selected by the touring committee was a poor one, and that the road directions given were inadequate. This was particularly so after Chicago was reached. From that point on Frank X. Mudd, the local committeeman, was supposed to have charge of sending out the confetti cars and marking the roads. He displayed a lethargy that was aggravating to the tourists, who were not sparing in their criticisms. The roads were not properly marked, and as a result of this the tourists lost their way many times and rode a great number of miles before getting back on the right track again. The distances between towns were given in miles on the route cards, and these were often erroneous.

The tourists in many cases believed that a better and more efficient method would be to mark or designate the various junctions and turnings by calling attention to prominent landmarks, hills, etc. If another such tour is held it is very possible that some such method may be employed.

ing better has ever been found, ph, than to send out a car ahead of run to place arrows marking the e, as was done in the Boston and burg runs. These arrows not only the road during the progress of the for which they are placed, but re- to direct others who may travel over route later. This is proven by the that between Buffalo, N. Y., and Pa., over the old Pittsburg run , the arrows still remained, and, being no confetti that day, were used tides by the St. Louis party.

will be remembered that in the South to Chicago stage Mr. Mudd learned e last minute that the supply of con- was not on hand. He at once secured oply of corn and beans and scattered to mark the route. The fowl en took advantage of this unexpected uet, and many were killed, their ers serving as confetti to tell of the ge of the early starters.

Trade Literature Received.

e Burlington Basket Co., Burlington, Catalogue of the Hawkeye refrigerator t, with "a few good recipes prepared nother."

& J. Tire Co., Indianapolis, Ind.—Re- of a report on the recent motor cycle rance contest, showing that G. & J. were used on all machines.

ctric Appliance Co., Chicago and San cisco.—Catalogue of electrical supplies as and gasoline engines and automo-

exander & Crouch, Chicago.—Cata- of automobiles and marine engines.

nerican Battery Co., 172-174 South on street, Chicago.—Catalogue of rican monitor type ignition storage ries.

L. Altemus & Co., Harrison Building. delphia.—Circular of a marine auto- high-tension circuit breaker and

New Incorporations

e Logan Construction Co., Chillicothe, Incorporators: Joe T. Schilder and s.

oria Automobile Co., Peoria, Ill. In- rators: S. K. Hatfield, Chas. L. Gage, L. Gibs.

porters' Automobile Salon, New York Capital, $4,000. Incorporators: Ed. irdsall, C. R. Mabley, Ed. B. Galla-

tomobile Transfer Co., Cleveland, O. tal, $10,000. Incorporators: G. B. Sid- O. G. Bechtel, F. A. Quail and G. A. h.

nerican Automobile Co., Washington, Capital, $100,000. Incorporators: s Manty, H. Ralph Barton, Beverly S. ford.

MINOR MENTION

There are prospcets of an automobile club in Salt Lake City.

Putnam, Conn., is to have an automobile race meet on August 31.

A race meet for owners only is to be held in Denver, Col., on August 27.

J. R. Stirling & Sons have opened an automobile salesroom in Detroit.

The American Motor League has issued a booklet on the construction of macadam roads.

The race meet of the Davenport (Ia.) A. C. is reported to have been a most successful affair.

The Winton Motor Carriage Co. has opened a London branch office at 48 Holborn Viaduct.

The plant of the Fauber Automobile Co., of Elgin, Ill., was completely destroyed by fire on Aug. 11.

The Citizens' Transit Co., of Detroit, has put into operation a system of summer cars for use on trackless streets.

H. B. Stranahan & Co., of Cleveland, have issued a guide map of Northwestern Ohio for the use of motorists.

Marvin Cramer is credited with being the first man to stake out a government claim in Oklahoma in an automobile.

The Fageol-Aldrich Co., of Des Moines, Ia., is reported to have sold out a part of its business to the Olds Motor Works.

Automobile passenger transportation lines will soon be in operation between Spenser and Salisbury, N. C., and Pueblo and Beulah, Colo.

Rural mail carriers in Sioux Falls, S. D., and Menomonie, Wis., have adopted automobiles as a means of transportation over their routes.

An Indiana man in a petition to be declared a bankrupt states that a large part of his liabilities were for money borrowed to repair his automobile.

The R. M. Cornell Automobile Co., of Syracuse, N. Y., has commenced suit against the U. S. Express Co. for damages done automobiles in shipment.

E. J. Willis Co., 10 Park Pl., New York city, has added a line of automobile clothing for winter and summer wear to his list of supplies for the automobilist.

The automobiles recently constructed by the Winton Motor Carriage Co. for the U. S. Signal Corps have been delivered at Camp Atascadero, Cal., and will take part in the coming manoeuvres.

It is learned that automobile licenses have this year netted about $30,000 for the State of Massachusetts, and it is estimated that this sum is sufficient to construct about six miles of State road.

J. F. Buchanan, of Philadelphia, recently saved the life of a small boy who had been seriously injured while playing in one of the public parks, by taking him in his car and driving rapidly to a hospital.

The E. R. Thomas Motor Co., of Buffalo, write us that they will manufacture a limited number of six-cylinder cars of from 50 to 100 h. p. The first car of this type will be equipped as a racer and will be on the road in about eight weeks.

The Importers' Automobile Salon, which was recently incorporated, proposes to hold a show at the time of the annual New York show of the N. A. A. M. This action results from dissatisfaction over the amount of space allotted to imported cars in Madison Square Garden.

F. L. Martin, of Salina, Kan., has brought action against the Fredonia Manufacturing Co. for $540 damages on account of the defendant's failure to deliver four automobiles in good condition to the plaintiff before June 14. Mr. Martin claims that the car which was received a few days ago was in bad condition.

Secretary Metcalf, of the Department of Commerce and Labor, has declined to modify the ruling of the steamboat inspectors requiring that gasoline cars must be pushed on to and off ferry boats. The only course left to the automobilist, he says, is to bring a test case in New York and to appeal to the Secretary of the Treasury.

Sidney B. Bowman, of New York, will attempt to beat the non-stop record of 2,017 miles which is claimed to have been made by Weigel in England recently. While the attempt will be made during the week of the automobile carnival at Long Branch, it is learned on good authority that the A. A. A. has in no way sanctioned it.

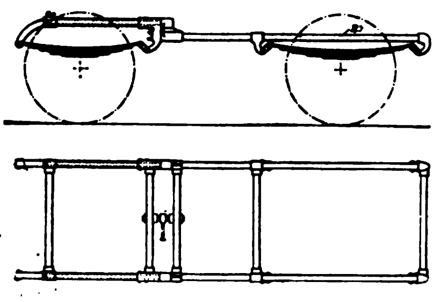
The Boston Automobile Trades Association has been organized. The officers are: W. W. Burke, president; A. T. Fuller, secretary; A. P. Underhiel, treasurer. The three mentioned and W. E. Eldridge and O. R. Bangs form the Board of Directors. Application will be made to the N. A. A. M. for sanction of a show to be held in March, 1905. Membership to the association is open to all Boston automobile dealers.

The following changes in the management of the Studebaker Bros. Manufacturing Co. will go into effect on January 1, 1905: Gol. George M. Studebaker will relinquish the management of the carriage department, become more closely identified with the executive department, and, as president of the Studebaker Automobile Co., give especial attention to the direction and development of that business. E. Louis Kuhns will relinquish the management of the sales department and assume the management of the spring vehicle factories. Lloyd F. Weaver will relinquish the management of the San Francisco branch and assume the management of the sales department at the home office. Chester N. Weaver will become the branch manager at San Francisco.

MOTOR VEHICLE PATENTS.

United States Patents.

763,494. Automobile. Louis Lacoin, of Paris, France, June 28, 1904. Filed December 26, 1903.

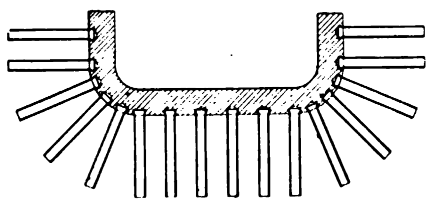


No. 763,494.

The frame of this invention is intended to enable a series of vehicles varying in form and dimensions to be made up in an economic manner and at the same time to increase the facility and regularity of the use of these vehicles by rendering possible and practical the attachment of the valuable part of the carriage framework mounted on two of the wheels to the remainder of the vehicle mounted on the two other wheels, and which part comprises the mechanism or the source of power, which is fragile and costly and requires frequent repairs. For this object the frame is divided into two parts, each receiving one of the groups of mechanism or parts hereinbefore specified. One of these parts is joined by means of shafts to a part above the axle of the other section in order to give, so to speak, a direct support to the half-frame of which they form part, the stability of the other part and the solidity of the attachment being assured by a number of bolts, nuts, keys or other suitable device appropriate for each case.

761,927. Cooling Device for Explosive Engine Cylinders.—C. E. Van Norman, of Springfield, Mass. June 7, 1904. Filed August 13, 1903.

A large number of sheet metal plates are anchored and joined in sockets therefor within the cylinder, the plates having bent formations, so as to present within a minimum space an unusual extent of surface for radiation. The plates are bent in the form of troughs or partial tubes. To secure an anchorage of the plates in the sockets provided therefor in the cylinder walls, metallic blocks of frusto-conical form are let into the sockets, and by forcing the lower ends of the plates over these blocks, they are expanded in the sockets and secure a firm hold.



No. 761,927.

763,871. Combined Brake and Mudguard. Frank L. Fisher, Cumberland, Md. June 28, 1904. Filed Jan. 6, 1904.

763,909. Rubber Tire. Alvaro S. Krotz, Springfield, Ohio. June 28, 1904. Filed Dec. 26, 1903.

763,931. Motor-Vehicle. Frank Schlais, Gad, Wis. June 28, 1904. Filed Sept. 10, 1903.

764,161. Self-Locking Steering-Gear for Automobiles. Reuben O. Stutsman, Peoria, Ill. July 5, 1904. Filed Oct. 30, 1903.

764,263. Motor-Coach. Roy Stone, New York, N. Y. July 5, 1904. Filed Dec. 1, 1902. Renewed Nov. 30, 1903.

764,356. Fly-Wheel for Explosive Engines. William B. Hayden, New York, N. Y. July 5, 1904. Filed Mar. 28, 1904.

Resolutions Against Speeding.

The New York Automobile Trade Association, on September 10, adopted the following resolution:

Resolved, That the New York Automobile Trade Association is heartily in sympathy with the earnest efforts being made by various persons and associations to mitigate the evil of reckless speeding in dangerous localities, and to foster strict observance of the rules of the road. While we favor the fullest development of the automobile, and feel an interest in trials of speed where due precautions are observed, at the same time we condemn the wanton and unlawful indulgence in excessive speed, which endangers the car, the driver and the public.

Obituary.

W. O. Anthony, secretary of the Anthony Motor and Manufacturing Co., of Colorado Springs, Col., and an occasional contributor to The Horseless Age for the last five years, was killed in an automobile accident on August 7, while on a club run of the Colorado Springs Automobile Club. The following account of the accident has been furnished us by his firm: Mr. Anthony was riding with a friend in a Cadillac on one of the smoothest stretches of road in the course, when, without any warning or known cause, one of the rear wheels splintered to pieces, letting the rear end of the car down. This caused one of the front wheels to completely dish, and the car turned completely over, pinning Mr. Anthony and his friend beneath. Mr. Anthony was crushed to death immediately, but his friend escaped with but few injuries.

LEGISLATIVE AND LEGAL.

Jersey Justice

On Sunday, Aug. 7, while driving his car at slow speed in Hackensack, Dr. J. Finley Bell, of Englewood, N. J., was arrested for driving a car without a license. He was taken before a magistrate and fined $15 which was paid under protest. The doctor had made application for a license, but owing to a delay occasioned by a misunderstanding had not yet received it.

The arrest was made without a warrant, and no sworn testimony was taken before the fine was imposed. Later, when the doctor's counsel endeavored to get at the records of the case for purposes of entering an appeal, he was informed by the magistrate that no record had been made of the proceedings, as court had not been opened. Defendant's counsel then maintained that if court had not been opened the magistrate was guilty of extortion, in that he had taken the sum of $15 from the defendant without due process of law, or, if court had been opened, that there should be records of the case and of the sworn evidence which should have been taken. The magistrate then offered to return the fine, but the doctor refused to accept it, and has determined to push the case to a conclusion. He has commenced suit for damages against the policeman who made the arrest, because of false arrest and trespass.

Sec. 11 of the Scoville Act provides that arrests may be made without warrant for driving a motor vehicle contrary to the ninth section, which pertains to racing on the highways, but arrests for other offenses under the act must be made with sworn warrants. The irregularity in the conduct of this case, the doctor says, is characteristic of a large percentage of automobile cases in that locality.

Jano Steenes, of Salem, Mass., was recently discharged by Judge Safford when accused of speeding by a country constable, who has not figured out how many feet there are in a mile.

Hammonton, N. J., was the scene of the latest "gun hold-up." A farmer with a shot gun held up several automobile parties on the road to Atlantic City, and in at least one case fired at the car. The A. C. A. is investigating.

The fight between the A. C. A. and the deputy sheriffs on Long Island who hold up cars at the point of a gun seems to be progressing in favor of the club. Two of the latest victims have been released by the courts, and criminal proceedings have been instituted against the deputies concerned.

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The Business Vehicle Situation Here and Abroad.

The automobile may be regarded from two entirely different points of view—either as a means of sport or as a business conveyance. All the pioneers of the industry had in view particularly its future as a business vehicle, and the term "sport" in connection with automobiles came into vogue only at a comparatively late period, when races and other competitions became frequent. Gradually the conception that the automobile is chiefly a means of sport seems to have become firmly established in some quarters, and it is not unusual to find on the sporting page of a daily a notice regarding a proposed application of commercial motor wagons, by the Post Office authorities, for instance.

The conception of the automobile as a means of sport is justified to a greater degree in Europe, and particularly Continental Europe, than it is in America. Continental manufacturers are dependent for their clientele mostly upon the large leisure classes in those countries, while a large proportion of American owners are business or professional men, who get some practical use out of their car. The so-called middle classes of Continental Europe are much more chary in regard to their expenditures for pleasure purposes than the same classes in the United States, and are more inclined to seek their diversion along traditional lines, the eagerness for being "in the swim" being less prevalent. Consequently, the automobile movement in those countries is more restricted to the wealthy classes. This statement may appear unwarranted in view of the oft-mentioned enormous development of the automobile movement in France. As a matter of fact, though, the extent of this development is frequently over-estimated. According to the latest statistics (1903), there were in use in that country at the end of that year only between 19,000 and 20,000 automobiles. By way of comparison, it may be mentioned that since the new law went into effect in New York State, on May 4th last, there have been registered with the Secretary of State at Albany close to 14,000 cars. This includes roughly 5 per cent. which are owned by non-residents, leaving nearly 13,000 cars owned by residents of this State, with less than one-fifth the population of France. It is a matter of common observation among tourists in France, that, outside of Paris and its immediate vicinity, automobiles are met with on the highway only at long intervals. A large proportion of the cars produced in France the last few years have been exported, the value of exports last year amounting to no less than $10,000,000, representing probably over 5,000 machines.

The use of light motor-propelled vehicles for business purposes is very much more general in the United States than in any other country, and is rapidly increasing. Physicians, contractors, real estate men, newspaper men, drummers, etc., all find the auto helpful in their work, far beyond the possibilities of the horse. The conditions for the development of practical applications of the auto are in general much more favorable in this country than abroad. In the first place, the people are more enterprising, and quicker to take advantage of new developments in means for carrying on their business, this enterprise and favorable inclination toward new ideas being even more pronounced in the West than in the East. Another favorable condition is that all the smaller cities and towns are scattered over large areas, instead of being built up compactly, as abroad, thus making rapid transit almost imperative. This very condition led to the phenomenally rapid introduction of trolley lines in all country

towns of 25,000 inhabitants and over, and may confidently be expected to have a similar effect on the introduction of automobiles. A further point in which the automobile movement is more fortunately situated in this country than in Europe, is that the fuel is materially cheaper here. Also, owing to the more extensive use of machinery, even in agricultural districts, small machine shops are more widely distributed, thus affording great facilities for repairs.

There is only one factor affecting the practicability of the automobile in respect to which the United States is less fortunately situated than European countries, and that is the roads. American roads are poor, and the wear and tear on cars is consequently relatively greater. Fortunately, the Good Roads movement is constantly assuming greater proportions, and the last obstacle to the almost universal application of motor vehicles for business purposes is therefore gradually being overcome.

Fair Treatment of Customers.

In our "communications" columns this week, a correspondent complains of the indifference of certain agents and manufacturers with respect to the operation of their cars after they pass into the customers' hands, and asks a remedy for this state of affairs. It is unfortunately true that there are still some concerns in the automobile trade whose business methods are not above reproach, and who lose all interest in a customer once he has made his final payment. Such firms are, of course, not in the business to stay, and are constantly being eliminated. The conditions in the automobile industry a few years ago, when the demand for cars of certain types very much exceeded the capacity of the manufacturers for turning out machines, is largely responsible for this shabby treatment of customers; but conditions have changed since then, and many of the unscrupulous dealers have found it necessary to frequently change their connections, or even to quit the business entirely, while others have changed their business tactics.

We believe that agents and dealers have been more open to censure in this respect than manufacturers, as the latter usually realize that in order to build up a permanent business, it is necessary to stand behind thier product, make good any possible defects, and show a general spirit of helpfulness toward users of their cars—in other words, build up a reputation for integrity and courtesy toward customers. An established reputation will become more and more valuable as the business grows older, and consequently greater efforts are constantly being made to insure satisfaction of users. As a rule, automobile owners are not so apt to talk of exceptionally considerate treatment received than of complaints they have to make. yet we know of at least a half a dozen cases where manufacturers have replaced parts which they considered of insufficient strength, or otherwise defective, without waiting for a complaint from the customer, or have replaced broken or worn parts free of charge long after the expiration of the term of guarantee. Many of the metropolitan sales agencies, however, have been much less considerate in their treatment of customers, and one of the results is that there are almost continual changes in these agencies.

Time and increasing competition will do much to rid the business of unscrupulous and unreliable concerns, and we do not know of any method by which this process might be accelerated except, possibly, by owners more generally exchanging their experience with the firms from whom they buy, at the clubs and elsewhere.

That Non-Stop Run Sanction Again.

There has been published in a number of New York dailies during the past week a letter from the Chairman of the Touring Committee of the A. A. A. in which he gave the "sanction of that association through its touring committee" to the non-stop run attempted by one of the entrants for the St. Louis tour. In the letter it is stipulated that the party to whom sanction was granted was to undertake to pay all the expenses of the observers and see that the association was under no expense whatever. The run, it thus develops, was held under official sanction of the Touring Comittee, and the whole responsibility for the unsatisfactory conditions under which the run was made rests with this committee. In the first place, the provision that the applicant for sanction pay all expenses of the observers is entirely wrong. Expenses of the observers should be paid by the association and the applicant for sanction should be required to pay to the association a certain charge for each day the run is in progress. This is one of the rules observed by the A. C. G. B. I. in sanctioning non-stop runs.

We have already pointed out that the official observers were materially interested in the success of the venture, and the Touring Committee showed an absolute lack of judgment in approving them. The passage in regard to payment of observers' expenses in the above mentioned letter suggests the idea "Do anything you like, as long as it doesn't cost us anything." As though the A. A. A. had nothing else at stake!

Speedmeter Evidence in Speed Cases.

A legal decision that will probably have a booming effect on the speedmeter business, was rendered by Judge Berry, in the Lynn, Mass., police court, on August 11. Robin Damon, of Salem, an occasional contributor to our columns, had been accused by a number of police officers of having driven his touring car through the streets of Lynn on the previous Sunday at a speed exceeding 15 miles an hour, thus exceeding the legal limit. The policeman claimed to have timed the car with a stop watch over a measured course, and to have found it to travel at the above-mentioned rate. Mr. Damon carries on his car a speed-indicating instrument, and both he and his companion, Mr. Mansfield, swore that according to the reading of the instrument the machine traveled inside the legal speed limit. Judge Berry was of opinion that the instrument was more reliable than the outfit employed by the police for determining the speed of the car, and discharged Mr. Damon.

This is the second case, we believe, where an automobilist accused of speeding has been discharged on his own sworn testimony, based upon the indication of a speedmeter, that he was not exceeding the legal limit. We have thus two well established precedents, and it seems permissible to assume that if an automobilist carries one of these instruments on his car, and regulates his speed in accordance with legislative requirements, he will be exempt from police persecution. The introduction of speedmeters of the several kinds now on the market, has been retarded by their comparatively high price, but if they are a sure protection against unwarranted legal persecution, they ought to be well worth their price, especially to owners of large touring cars, who are particularly exposed to such persecution. The reliance of the police court justices in the speedmeters we be-

be well deserved, as the several in-
ts now on the market are well
nd, with positive gearing, cannot
give correct readings. It is to be
hat with the probable increase in
and for these instruments follow-
recent decisions, there will come a
ial reduction in price, as this is
ly necessary to make a very ex-
application possible.

nti-Speeding Crusade in Paris.

ss speeding is indulged in probably
ely in Paris than in any other city
Boulevard of the Champs Elysées
used as a race-course by not a few
rs. There have been many public
and occasionally the police have
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the failure of the police in putting
the nuisance, the New York *Her-*
hed the conclusion that probably
success was due to the lack of
hich are necessary for every ven-
d, being public spirited, started a
tion with a purse of $2,000 to put
fect of Police in position to cope
problem. It may appear somewhat
ent for the founder of the Inter-
Cup race, who is lending his aid
evelopment of the speeding abilities
nobiles, to be heading at the same
a movement to keep down the
f the machines; and French auto-
profess to be unable to see any
good in Mr. Bennett's latest act of
ty. The results have already set
pears, and there have been regular
e arrests of automobilists in the
Elysées districts for some weeks
ll the automobile papers denounce
nett's action, and one even gets
lling him that he should remember
in New York he belongs and that
he is a mere stranger to whom sym-
hospitality is being accorded. The
shows well to what illogical ex-
ome papers will go in defending
ey consider the interests of auto-
. Bennett's avowed object is to
lawless speeding, an object which
e approved by every law-abiding
If the police, when instructed to
ecial offenders, arrest all automo-
ithout regard to their speed, it is
o are to be blamed.

Mechanical Ignition Generators---II.

By Albert L. Clough.

The Custer Beam Works, of Germantown, Philadelphia, offers to the public a dynamo (Fig. 1) of neat and compact form which is arranged to be driven either by flat belt or by friction pulley on the engine fly-wheel. Its dimensions are 11 in. over all along the shaft, 5 in. over all across the shaft and 6⅜ in. high. Its normal speed is 1,200 r. p. m., at which rate it will deliver 5½ amperes at 10 volts. In order to secure a nearly constant speed of rotation independent of the engine speed, a centrifugally operated clutch pulley (Fig. 2) is employed to drive it. Two revolving weights, A A, the centrifugal tendency of which is opposed by an adjustable spring B, actuate mechanism which determines the frictional contact between the internal surface of the pulley C and expanding blocks D D rotating with the armature shaft. The bell cranks of the governor weights are secured to studs E E, which are cut with right and left-handed threads at their opposite ends, respectively. The threaded portions of these studs are screwed into the opposite expanding blocks D D, which are adapted to be moved inward and outward on guide pins passing through oblong slots on the webs F F of the blocks and being screwed into a disk G fixed on the armature shaft. H is an oil drum or bushing fixed to the armature shaft by a set screw, and on this bushing is mounted loosely the driving pulley C, the outer extension of which serves as clutch drum. The expanding clutch blocks D D are faced with fibre.

If the pulley speed momentarily exceeds the normal, the weights B B fly out and remove the frictional connection, allowing the armature to slacken its speed, while if the speed is less than normal, the spring B forces the pulley and clutch blocks into frictional relation, and the armature is accelerated.

The oil in the hollow bushing H feeds through a wick to lubricate the frictional surfaces which are of very liberal size and of bronze against cast iron. An adjustment upon the spring B, by means of the adjusting screw S, allows the governor to be set to maintain any desired speed, within limits.

Fig. 1.—C. B. W. Dynamo.

This dynamo has a laminated armature core, mica insulated commutator of copper segments, brushes of a combination of copper gauze and carbon and large bearings lubricated by wick feed from oil reservoirs. At 700 r. p. m., its rated output is 2.5 amperes at 5 volts, and at 1,500 r. p. m. it is stated to furnish 7 amperes at 14 volts. It will suffice for charging storage batteries as well as for operating ignition apparatus direct.

The Apple Ignition Dynamos and magnetos are the product of the Dayton Electrical Manufacturing Co. of Dayton, O. The Apple dynamo is of the cylindrical ironclad type, weighs 16½ pounds and is 5 in. wide, 6 in. high and 11 in. long. A removable door completely closes the commutator end of the machine, thus protecting and at the same time affording ready access to the brushes, commutator and bearing. The pulley end is permanently closed so that the machine is fully encased against the entrance of oil, water or dust. No oil is used in the lubrication of the shaft bearings, but special bushings of a lubricating compound are employed. Hard drawn copper segments with mica insulation are used in the commutator upon which bear compound brushes held in a self-adjusting holder. These brushes consist of a wire gauze portion held between two carbon and graphite blocks. The former serves to ensure a metallic contact of low resistance, while the latter assists in lubricating the

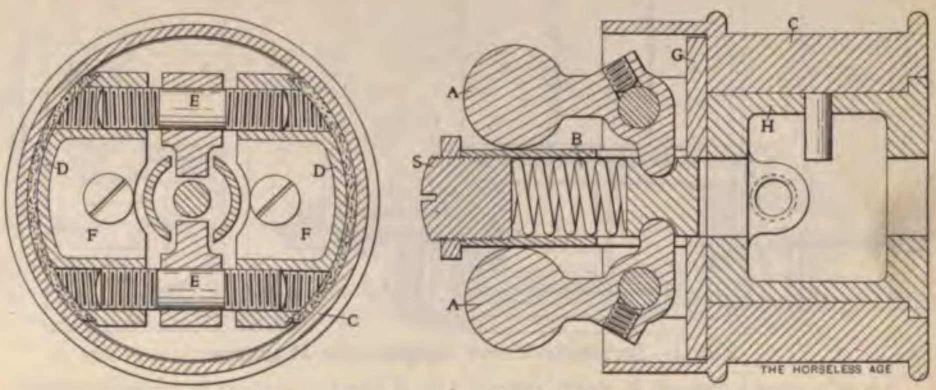


Fig. 2.—Governor of C. B. W. Dynamo.

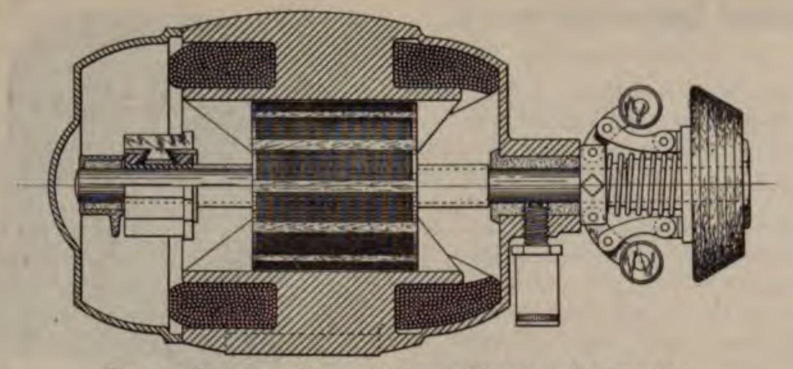


Fig. 3.—Sectional View of Apple Dynamo Generator.

commutator surface. Fourteen hundred revolutions per minute is the normal speed of this dynamo, and this rate of revolution of the armature is maintained independent of the engine speed by means of either one of two governing devices: The automatic clutch pulley and the bevel friction governor. The former is a centrifugally operated arrangement which tightens or loosens the pulley upon the armature shaft as the variations of engine speed demand, with the result of maintaining an average predetermined speed. Either a leather belt, chain and sprockets or friction upon the fly-wheel may be employed as the method of driving.

The bevel friction governor consists of a leather friction cone or bevel pulley carried upon the extremity of the armature shaft and capable of sliding upon it. It is held toward the end of the shaft by a spiral spring, but is capable of being slid inwardly through the action of centrifugally operated weights and a suitable toggle arrangement. The dynamo is mounted in such a position as to bring the beveled face of its pulley into perfect contact with the fly-wheel rim. That is, it is mounted with its shaft at an angle with the crank shaft equal to one-half the angle of the cone pulley. When the engine is running at such a speed as to produce 1,400 r. p. m. or less in the dynamo, the spring above mentioned holds the cone pulley firmly against the fly-wheel, but if a greater speed is attained the centrifugal weights draw it inwardly along the shaft and thus more or less away from and out of contact with the fly-wheel, thus diminishing the armature speed. If desired, the outside edge of the fly-wheel may be beveled at an angle equal to half that of the cone pulley, in which event the dynamo may be placed with its shaft at right angles to the engine shaft.

By the use of these governing devices it is claimed that a gasoline engine of ordinary size may be turned rapidly enough by the crank to cause the dyanmo to generate the starting current, and, at the same time there is no danger of an excessive current being generated when the engine is running at full speed.

This dynamo is made with a special jump spark coil or a touch spark coil carried in its base and is also furnished with a battery of dry cells or an accumulator integral with it. The storage battery of the latter combination is constantly kept charged by the dynamo, so as to be ready to furnish starting current at any time. A special four-position indicating switch is used in this connection, which shows at a glance whether the ignition current is entirely cut off, whether the battery or dynamo is furnishing the energy or whether the battery and dynamo are in parallel with the former being charged. A dashboard type of Apple governed dynamo is manufactured which is mounted in such a manner that the commutator end projects through the dash and is closed by a cover, the removal of which allows the working parts to be examined from the seat. These dynamos are claimed to be equally effective in the operation of jump and contact spark systems and to operate with any good coil of either type.

This company also manufactures the Apple magneto, which is designed for the operation of all systems of contact ignition. It is adapted for belt driving or driving by means of friction upon the flywheel, in which case a spring base is supplied and a governer may be employed. Its weight is 8½ pounds in aluminum and it is of compact form, with fully enclosed working parts. Its lubrication and commutation is similar to that of the Apple dynamo.

The Standard Motor Construction Co., of Jersey City, N. J., manufacture a gear driven alternating current magneto generator (Figs. 4-5) for use with contact spark systems. It is intended to be driven at the same speed as the crank shaft of the engine except with three cylinder motors, when it requires a speed of 1½ times that of the engine. No spark coil is said to be required, and it is stated that a speed variation of from 50 to 1,000 r. p. m. is allowable without marked difference in the size of the spark. The machine has a large shaft and large bearings with wick feed lubrication. The spark time may be varied since the current impulses are of considerable duration. Obviously no commutator is required upon a generator of this description.

Fig. 5.—Standard Magneto

"Autosparker" is the name applied to the ignition dynamo (Fig. 6) manufactured by the Motsinger Device Mfg. Co., Pendleton, Ind. It is of the horizontal bipolar type, with exposed shunt wound field coils which are specially water and oil proofed. The armature is built up of laminations and is drum wound and waterproofed with shellac. It is carried upon a specially heavy steel shaft, A, which runs in renewable phosphor bronze bearings fitted with felt wick lubricators, BB. The moving parts are fully enclosed and a removable portion, C, of the casing allows of inspection of the brushes and commutator. Heavy insulating bushings pass through the casing, in which are carried the holders, D, of the spring-pressed radial composite brushes, bearing upon the mica insulated commutator. In this generator the field, E, which is of soft iron, is wound so as to become

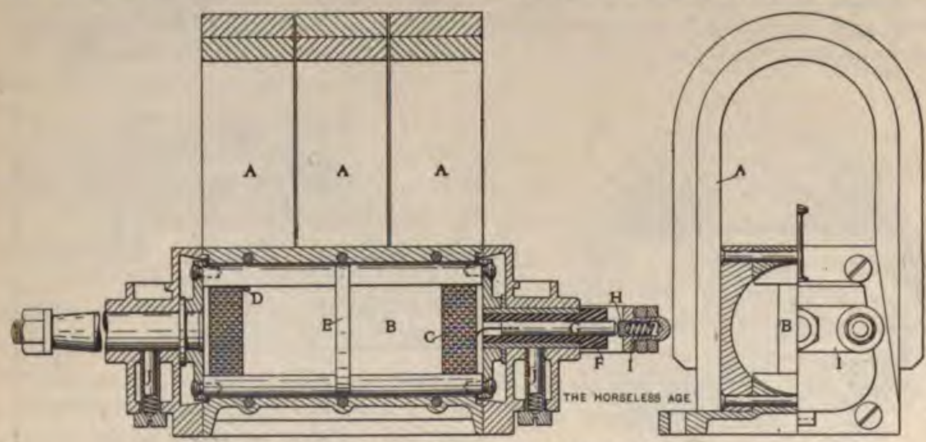


Fig. 4.—Sectional Views of Standard M agneto.

A A A, permanent magnets; B, shuttle armature coil; C, armature winding; D, grounded armature terminal; E, armature band; F, insulating bushing in hollow armature shaft; G, revolving contact pin; H, stationary spring-pressed contact pin; I, insulated contact-pin support; J J, wick oilers.

saturated at a very low armature and higher speeds do not increase the tism and the voltage to nearly the extent.

method of driving and speed govnt in this machine is of considerable st. The whole machine, including the frame, field coils, F, armature shaft riving pulley, G, is carried upon two ons, H, supported by uprights, I, the base, J. This permits the whole ne to rotate slightly about a horizontal t right angles to the armature shaft. the projection of the armature shaft commutator end is carried a pair of fugal weights, KK, acting upon a col- , sliding on the shaft. As the speed ation increases the centrifugal force weights acts to push this collar along aft away from the machine. Restainst the hardened steel pin, M, which ne by the moving collar, is one exy of a peculiarly shaped bell crank N, which is pivoted in the stationary of the machine. Its other end is at- l by a link, O, acting in a vertical with the commutator end bearing of mature shaft. An adjustable spring, ps the bell crank lever arm, which is with hardened steel, in contact with eel pin, M, of the sliding collar.

machine is generally placed with its , G, which is of highly compressed in frictional contact with the under e of the rim of the engine flywheel, nder these circumstances, the action governor is as follows: So long as eed produced in the armature shaft than the predetermined rate of revothe paper pulley is in full contact he balance wheel and is driven withp, but whenever the armature speed s the desired value, the centrifugal s push out the sliding collar, L, t the influence of the spring, S, and, ng the linkage, raise up on the comr end of the armature shaft, rotating nerator on the trunnions, H, and its pulley end downward and out tact with the flywheel. As the armaeed decreases, the springs overcome trifugal force and the pulley, G, once omes into driving contact. By suitable adjustment of the spring any desired average speed between 600x1,200 r. p. m. may be maintained in the armature independent of the engine speed.

The "Autosparker" weighs 23 pounds and occupies a space of $10\frac{1}{2}$x10x$6\frac{1}{2}$ inches, and it is guaranteed to start any engine that is equipped with a proper spark coil and can be turned by hand at as many revolutions per minute as is given by dividing 1,100 by the diameter of its flywheel in inches.

A special jump spark coil, manufactured by the Motsinger Co., is recommended for use with the "Autosparker."

The Holtzer-Cabot Co., of Brookline, Mass., manufactures a magneto generator (Fig. 7) of neat design and finish, especially adapted for use with contact spark ignition systems. The field is composed of three or more powerful horseshoe magnets of specially selected steel most carefully magnetized. An armature of the drum-wound form with laminated core is employed, which is carried on a crucible steel shaft running in phosphor bronze bearings, lubricated by means of grease cups with pin feeds. Double silk covered magnet wire is used for the armature winding in order to economize wire space and secure adequate insulation. The commutators are very carefully made and insulated and composite brushes built up of copper and carbon are employed, which secure perfect conductivity together with the lubricating quality due to the graphite in the carbon. The brush holders being unusually large, brushes of ample cross-section and long life may be used.

These magnetos are made in several sizes. No. 0 is intended for a large output and has, in addition to the permanent field, two series coils, located close to the armature, which increase the magnetic flow, particularly during periods of heavy load. This machine is stated to operate successfully with some forms of jump spark coils. It is $11\frac{1}{2}$ inches over all along the shaft, $4\frac{1}{4}$ inches through the magnets and is $10\frac{3}{4}$ inches high. No. 1 igniter is of somewhat smaller size than No. 0 and is especially recommended for contact spark ignition, but is also stated to be applicable to jump

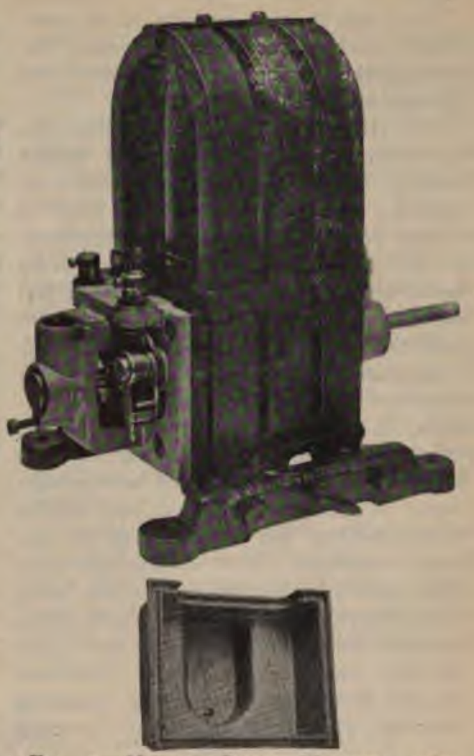


FIG. 7.—HOLTZER-CABOT MAGNETO AND COVER FOR BRUSH MECHANISM.

spark systems. Its dimensions are $8\frac{1}{4}$ inches along the shaft, $7\frac{1}{8}$ inches across the shaft at the base and $9\frac{7}{8}$ inches high.

Nos. 2 and 3 are still smaller than No. 1 and are known as the "automobile type," being intended for contact spark ignition on machines up to 15 h.p. No. 2 is a vertical form with the following dimensions: 7 inches along the shaft, $6\frac{7}{8}$ inches across the shaft on the base and $8\frac{5}{8}$ inches high. No. 3 is horizontal and is $9\frac{7}{16}$ inches long, $6\frac{7}{8}$ inches wide and $4\frac{13}{16}$ inches high.

This company's type E is a dynamo of the cylindrical iron-clad form and is specially intended for jump spark ignition in connection with a speed governing pulley. When, however, it is used with the wipe spark system a special winding is employed which is stated to permit a speed variation of from 1,000 to 2,500 r. p. m. without damage. It is $8\frac{9}{16}$ inches over all along the shaft, $6\frac{1}{2}$ inches over all along the base and has a height of $7\frac{3}{4}$ inches.

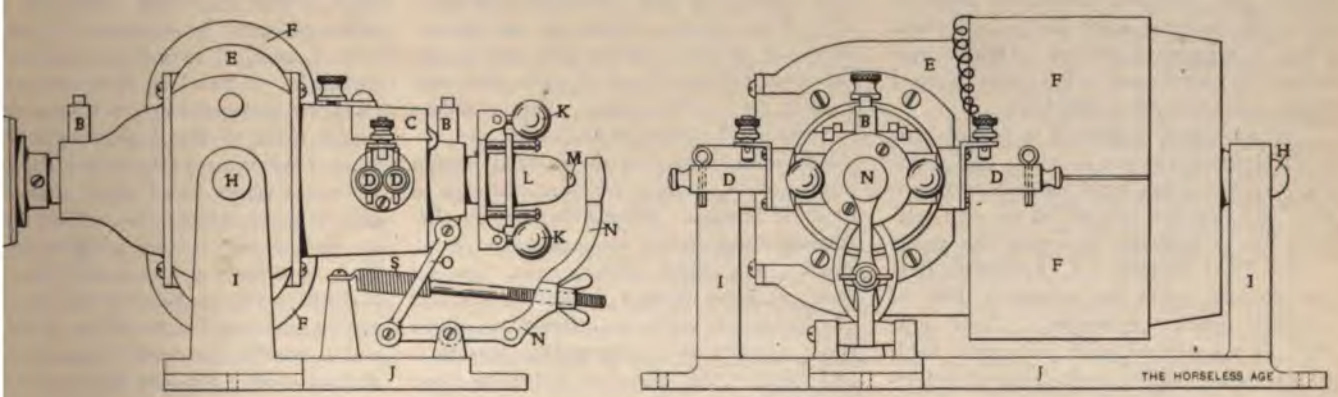


FIG. 6.—MOTSINGER AUTO SPARKER.

With this dynamo, the use of an automatic switch is recommended, which disconnects the starting battery as soon as the dynamo speed reaches the normal.

The Miller-Knoblock Electric Mfg. Co., of South Bend, Ind., are in the market with a magneto (Fig. 8) provided with auxiliary field coils, to which the name of "Quick Action" is given. It is recommended for use with either contact or jump spark systems. When used with the former, the field coils are in parallel and when with the latter the shunt field is employed.

Magnets of imported steel are used. The armature core is of Norway iron laminations, wound with double silk covered wire, specially waterproofed and is carried upon a steel shaft in large phosphor bronze bearings. A commutator of the end contact type instead of one of the cylindrical pattern is employed. The working parts are fully enclosed, the commutator end being closed by an aluminum dome-shaped cover, which is held to the pole pieces by a bayonet joint secured by two screws. Two holes in this aluminum cover carry insulating bushings through which pass horizontally

FIG. 8.—MILLER-KNOBLOCK MAGNETO.

the tubular brush holders within which are carried the spring-pressed composite brushes. The cover may instantly be removed for inspection or cleaning of the commutator.

Either flat or grooved pulleys of any size, or friction pulleys, are supplied as desired. The generator base is of aluminum or brass and is furnished with a spring and swivel to give the necessary driving tension at the pulley. Two thousand revolutions per minute is the normal speed and a governing pulley is supplied if desired. The machine weighs 15 pounds and is 8½ inches long, 5 inches wide and 7¼ inches high.

This generator is claimed to furnish sufficient starting current to spark engines of ordinary size when fitted with contact ignition, and requires no coil, as its own self-induction is sufficient to create the spark.

The Remy Electric Co., Anderson, Ind., manufacture quite an extensive line of magneto spark generators. Their type M.V. is a generator, with permanent fields of specially retentive steel, drum-wound armature, mica-insulated commutator, with steel core, carbon brushes and self-oiling bearings. Its rated speed is 2,500 r. p. m., but it is said to operate properly as speeds between 500 and 6,000 r. p. m. Either belt or friction driving may be employed, a special spring base being furnished in the latter case. Its weight is 11 pounds and its dimensions are: Height, 7 inches; length over all, 7 inches; width, 5 inches; base, 5x6 inches. It is intended for use with contact spark systems and is said to furnish the necessary starting current for small engines.

The M. V. 2 is a more powerful machine of the same general character as the foregoing, but is intended for use with either jump or contact spark systems. In the former application, a special jump spark coil is demanded. This magneto weights 13 pounds and is 7¾ inches high and 7½ inches long over all with a base of 5x6 inches. A speed range from 200 to 4,000 r. p. m. is said to be permissible in the driving of this generator.

This company also manufactures a slow speed, gear or sprocket driven alternating current generator for jump spark ignition in connection with a special coil, known as type H 3.

Its speed must bear a fixed and predetermined ratio to that of the engine and it carries upon its own shaft a quick break mechanism and provisions for varying the time of ignition. For the sparking of multiple cylinder engines by the alternating current a similar generator is offered with a distributor made integral with it.

Its height over all is 10 inches, its length 11 inches and its width 6 inches. These alternating generators dispense with the commutator and the coil vibrator.

The Automobile in Vaudeville.

A burlesque on automobile breakdowns (pannes) is at present being given at the Moulin Rouge music hall in Paris. In the third act of the operette, "The Toreador," two comedians, Prince and Claudius, appear on the stage, fitted out in the latest style of automobile togs, dust-covered and oil-stained, and properly begoggled, working around a 95 h. p. (running gear and body work by the decorator Amable). They file, unscrew, unbolt, oil and grease, above as well as underneath, and handle the most variegated set of tools that may be seen on a work bench. They turn the starting crank, throw in the clutch and unclutch again, producing the familiar hissing sound of a charge escaping through a throttled passage. Meanwhile, they are discussing dogmatically connecting rod head, spark plugs, short circuit, coils. One of them produces from a drawer in the rear of the car a book of instructions, three times as thick as a metropolitan directory, and together they search in it for the cause of their plight. The audience meanwhile convulses with laughter.

Design for a Touring Car Dashboard.

BY JULIAN C. CHASE.

Although there is to-day a marked tendency toward simplicity in the general design of cars, the fully equipped dashboard of a touring car de luxe would seem, at first sight, to indicate that the current was running in the opposite direction. A glare of brass and shining glass, and a confusion of switches, dials and indicators, it delights the eye of motorists and appalls the uninitiated.

It would seem that the number of parts to be watched was rapidly multiplying, and the car, as a whole, becoming more delicate and more dependent upon expert care to keep it in operation. But this is not true, and the apparent increased complication is in reality a simplification in design and operation. A number of necessary devices which were formally distributed in various places on the car, have been brought together and placed in the dash, where they can be more closely watched and more readily adjusted. To this group have been added a few devices which are useful in that they indicate the proper or improper condition or action of certain parts of the car, and although they may not directly affect the performance of the car, they will indicate trouble before it might otherwise be found out, and may thereby save much inconvenience and possibly prevent real harm to some part.

Besides these two classes of fittings, there is usually another, the range of which depends to a large extent upon the character of the owner of the car. They may be called useful luxuries, for they are in no way essential to the operation of the car and merely serve to indicate facts which may be interesting to the operator.

To the first of these three classes—the necessary, the useful, and the useful luxuries—belong the spark coil, the commutator, the ignition switch and the pressure or mechanical feed oiler. The spark coil has long been one of the fittings for the dashboard. If it is of the vibrator type, it is especially desirable to have it where it can be watched while the car is running, and where the vibrator can be adjusted as conveniently as possible, and the connections readily inspected. The fact that in this position it is subjected to only little heat is another reason for placing it on the dash. It has long been customary to place the commutator or "make-and-break" device close to the engine itself, but the many advantages to be gained by placing it on the dash more than outweigh the reasons for locating it near the motor. In the first place, in this position it is not likely to receive any excess of oil or mud. If fitted with a glass cover, its working can be observed by the driver at any time, and if trouble develops it can be adjusted without getting out into the mud and working in a cramped position.

It is very comforting to know that all

parts are receiving the proper quantities of lubricating oil, and it is a great convenience when it becomes necessary to vary the amount of oil fed to any bearing, to be able to do so without raising a bonnet or footboard and then working in grease and dirt. Both of these benefits are derived from placing a sight feed oiler on the dashboard. Oilers are now to be had which will not in any way detract from the appearance of any car, but, on the contrary, are quite ornamental.

The second class, that of useful devices, comprises the following: Spark-gaps, volt ammeter, water circulation indicator, oil gauge, oil feed pressure indicator, and gasoline gauge. The use of the auxiliary spark gap was much discussed about a year ago, and many arguments both pro and con were advanced. While its beneficial effect on the ignition has been placed in doubt, its value as a "tell-tale" device has never been question. It is desirable to place these "gaps" on the dash under the eye of the operator. If one of the cylinders misses, and the spark fails to appear at any gap, the cause of such missing is at once apparent. On the other hand, if the spark can be seen and a cylinder misses, it is very good evidence that the trouble is caused by improper mixture or the faulty working of the valves.

If the gaps are located at the plugs, they can be seen only when the bonnet is lifted, and are therefore of no use in indicating the operation of the ignition circuit when the car is moving. In a large proportion of cases, when the gaps are located on the dash, the cause of the trouble is made apparent before the motor stops, and the operator can directly go about setting things right.

A volt-ammeter, wired so that it can be thrown in or out of the electrical circuit at the will of the operator, is a great convenience, as it will serve to indicate the condition and operation of the batteries or dynamos. If missing is caused by a weak battery, the cause can be immediately located by reading the voltage and amperage, and if a double equipment be carried the reserve battery can be thrown in with the double throw switch before the motor comes to a stop. When a dynamo is used, it is well to occasionally read the voltage of the current which it is generating. If the governor fails to work, it is likely to generate too high a voltage and there is danger of burning out the armature and of puncturing the condensers of the coils. If too low a voltage is being generated, from which missing is likely to result, it indicates slipping of the belt or governor, or improper contact of the brushes of the dynamo. The circulation of the water in the cooling system may be indicated by a pressure gauge. An absence of pressure will indicate that the pump has failed for some reason, and this fact may become known before any serious consequences result. There are other devices besides the pressure gauge which serve the same purpose. The fully equipped car will have on it a device of this kind.

An indicator showing the pressure in the lubricating device will in many instances betray faulty conditions in the means of obtaining this pressure, which is necessary to feed the oil to the various bearings. Gauges showing the amount of gasoline and lubricating oil in the tanks will reduce the liability of running out of these essentials in places where they are unobtainable.

The third class, that of useful luxuries, has no limits as to the number and variety of devices which may be included. Those which are commonly found on a touring car, and have the more reason for their existence, are the odometer, speedmeter, clock, change gear indicator, and annunciator signal from the tonneau or limousine. There is probably no need to speak of the value of the three first inventions, beyond drawing attention to the fact that the elements of time and distance have much to do with automobile laws and ordinances. The speed gear indicator is more or less of a toy, but may help to remind the operator as to which speed it is that he is running on. The signal from the tonneau, in the form of an annunciator, communicates to the operator by means of electric drops, the will of the passengers in the rear of the car. By means of it they may signal to go "slow," "fast," "stop" or "back."

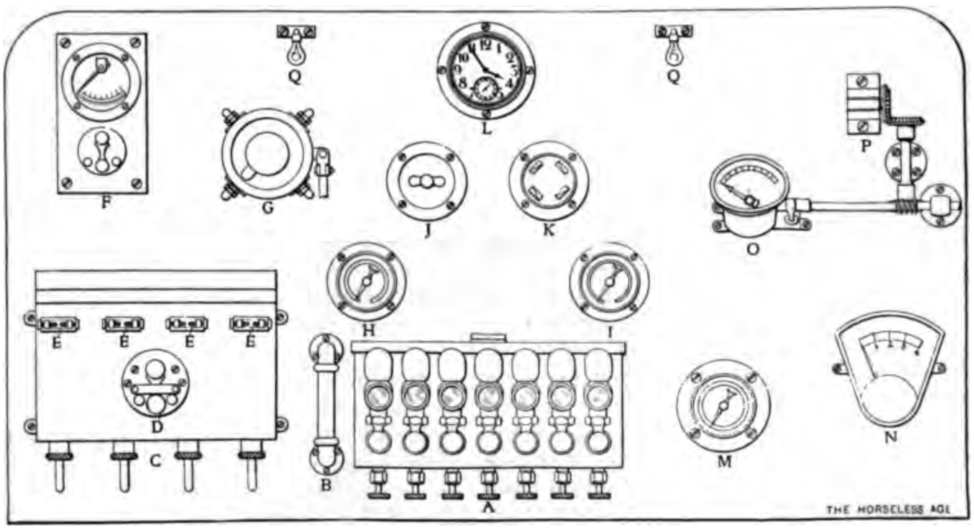
As has been said, the number of devices of this sort which can be fitted to a car is limited only by the whim of the owner. A large car has come under the writer's observation which was equipped with most of the devices described and in some cases, in duplicate, and had also attached to it in various places, but principally on the dash, a barometer for indicating the altitude, a wind gauge for showing the atmospheric pressure as the car sped along, a gauge which showed the air pressure in a reservoir the supply from which was used to sound the horn and blow up the tires, and a large swinging searchlight mounted on the top edge of the dash.

Much might be said as to the relative location of these various appliances on the dash, but it would seem that an arrangement in groups according to their character would be the best. Those pertaining to the ignition, those pertaining to the lubrication, and those which are merely luxuries should each be arranged together in a group or on a panel of the dash, to borrow a term used in connection with electric switchboards.

As the ignition system usually requires the most attention, the devices pertaining to it should be arranged in the most accessible position. This is undoubtedly at the left hand side of the board, looking toward the front of the car. Here they are away from the steering wheel and can be reached without working over the controlling levers. If the wheel is located on the left hand side of the car, the conditions are, of course, reversed.

Of next importance is the lubricating system, and for this reason its appurtenances should be grouped just inside those of the ignition system. The part of the dash in front of and to the right of the steering wheel can be given over to the "luxuries."

A pair of miniature electric lamps will not only materially add to the appearance of the dash, but will facilitate driving at night. The necessary current can be obtained from the source of supply for the ignition system. A small switch will light them and cut them off when not required.



DESIGN FOR A TOURING CAR DASHBOARD.

A, multiple oiler; B, oil gauge; C, spark coils; D, ignition switch, E E E E, spark gaps; F, combined volt and ampere-meter with switch; G, commutator; H, oil feed pressure gauge; I, water circulation gauge; J, lamp switch; K, annunciator signal; L, dashboard clock; M, gasoline gauge; N, change speed gear indicator; O, speedmeter; P, odometer; Q Q, miniature electric dashboard lamps.

LESSONS of THE ROAD

A Test Run in the New Hampshire Hills.

By J. D. Adams.

A neighbor of the writer, Mr. G., after operating his new car a week between house and office on a twelve-mile stretch of macadam was palpably chafing at the "child's work" demanded of his 16-h.p. motor. He had not yet acquired that lofty contempt for "prehistoric" road laws which distinguishes more experienced chauffeurs, and dared to exceed the speed limit no more than three or four miles, but it was maddening to feel the engine loafing along with throttle half off, and realizing what it could do if given a fair chance.

In buying a car of ample power, he had in mind the journey to his summer home in the New Hampshire hills. It was a trip which seemed to provide all the elements of a regulation endurance run—roads most of the way (or at least open stretches which county expense accounts referred to as roads), many hard hills and a populace of conservative mind and unbending hostility to progress, as typified by the new sport.

Mr. G. had hardly learned to worm out of a pocket on a city corner without losing his engine and kicking in the reverse when his thoughts began to dwell seriously on this run. Aside from his desire to test his power, he was actuated by still another motive: The car was guaranteed for sixty days only, and he was feverishly concerned lest the time elapse with the manufacturers none the poorer. "A good hard trip," he would explain, "will shake everything down that isn't right, and the company will have to make it good."

The seventh day was finally chosen for the trip. It was tentatively suggested that a few more days on good roads would result in greater familiarity with the vagaries of the machine, but such carping would be fittingly answered in silence by the adjustment, with a show of considerable professional skill, of a certain screw, which, it had been discovered, in some manner affected the clutch; and the belittlers would retire in confusion, awed by this exhibition of mechanical competency. Mr. G. would not hear of taking less than five on the tour. "Is this a runabout?" he would exclaim scornfully.

Two ladies and three men accordingly ventured dubiously on the unknown upon the seventh day. The writer was taken because of his reputation as an authority on motor construction, acquired through a careful study of tonneau bodies, which enables him to name at a glance the maker of any car. This valuable equipment was deemed a safeguard against possible breakdowns. The other male passenger, being a "Tech." student, was retained to do the cranking, owing to his familiarity with machinery, and to deliver us from the more theoretical difficulties. The ladies were included as a token of confidence in the car's ability to pull through.

Before starting the working parts were oiled until they revolved like running water, especially the clutch. A counter irritant of gasoline relieved this difficulty. The morning was lowering and a soft mist beat pleasantly in our faces. "Ideal touring weather" we told each other, with an air of experience. We could have gushed over a typhoon under the exhilaration excited by the smoothly running motor and fine State roads which marked the first stages of the trip—through Weston, Concord and Groton, Mass.

Beyond Townsend the roads commenced to grow poorer, though nothing to discourage. We sighted two steamers about here, and for a while entertained a thought of passing them. The trick was attempted on a slight hill, but just as we drew alongside the rear one, the driver let out a notch, and she fled like a startled deer, leaving us skidding in a sandy gutter. Later they graciously drew to one side and let us pass, smiling amusedly at our averted 'thank you's."

About this time we noticed a seeming reluctance on the part of the motor to mote, and presently discovered that the emergency brake had been inadverently kicked in. The incident disclosed the fact that neither brake was adjusted to be of much practical use, so we began our first tussle with adjusting nuts and screws.

Toward noon we began to strike the real hills. In most cases the roads had not had their spring repairing, and they were certainly an object lesson in civic indifference. One hill of about half a mile was gutted laterally and longitudinally with furrows a foot and a half deep. Huge boulders cropped out at intervals, and a dozen springs started little brooks across and down the gullies. We had to take it on the slow speed, and about half way up the cooler boiled over and the engine laid down and stopped. There was ample water about, so we emptied the old and refilled with cold water from the brook. But the motor sulked for half an hour until the ladies discreetly fled. It didn't really regain its amiability the rest of trip, both cylinders missing intermittently, causing annoying little jerks, and making necessary recourse to the slow speed at the slightest grade.

One of the rear wheels also began to worry us with groans and squeaks. The spokes had started a little from the hub, but still looked pretty strong, so we kept on. We ran into East Jaffrey, New Hampshire, about 3 P. M. and had the pleasure of seeing the two steamers we had passed standing in front of the hotel. They had come round another way. We ate dinner here and had a local wheelwright examine the wheel, but its unfamiliar construction weakened his courage, and he advised us to risk it.

Ours and the steamers were the first cars of the season, and as soon as our presence became known about every young horse in the village was led out and introduced to the new bogey man. It was quite a pretty sight, a dozen horses or so waltzing about the square. Nearly every horse we met on the trip, after leaving Groton, acted badly, and served to emphasize the necessity of more stringent laws regarding untrained animals on the highway. They are a source of continual annoyance, and are having a distinctly harmful effect on the nerves of chauffeurs.

We dragged over the last five miles with one engine, chiefly on the slow gear, and when at last we drew up before the shuttered house, we felt that we had barely avoided adding two more horse-power to our motive equipment. The car was run on to the low piazza, to protect it from a fine drizzle, and our thoughts were willingly diverted from machinery to domestic problems.

Bright and early the next morning we had an opportunity to "see the works," for which we all had yearned so much in secret. A little perfunctory adjusting of the now familiar clutch screw and a half-hearted crank or two allayed our fear that the car might not need an overhauling after all; and for the next fifteen hours we reveled in carburetors, vibrators, valves, spark plugs, etc. Some three hours were expended on an ingenious automatic governor, turning backward and forward a little screw which seemed designed to advance or retard the spark. A little more thorough investigation showed us the screw really had no deeper purpose than holding the thing together.

We finally put together as many parts as we could find, but by this time the outraged motor positively declined to have anything more to do with gasoline or explosions of any sort, so we gave it up and went to bed, planning to return next morning by train.

The car had recovered her good nature by morning, evidently concluding we were not responsible and meant no real harm, and after a few pouts she hit it up quite blythely, and we decided to make the attempt after all.

Two days of rain had left the roads in a dangerous state and caused our only approach to a real mishap. In trying to dodge a puddle the whole car skidded violently into the ditch and all but upset. We were all jerked from our seats, and the chaperon was barely rescued from diving over the side of the tonneau. She explained that she wished to see what a wheel looked like skidding. The strain had been great, but we could find nothing started, and continued on our way, with growing respect for the strength of the car.

splashing from puddles bothered us d deal during the morning, cutting ır sparks, but we reeled off the mile- t a steady pace until half over the of mountainous hills between Jaffrey 'ownsend, when the engine gave out ther. We alternately cranked and ted for an hour, and at length found ıe rear cylinder was half full of water, ntly from a leak in the jacket. We ed it out with a handkerchief tied stick, and got an explosion on the rank. We had to swob out this cylin- veral times during the day, and did iscover the stop cock intended for emergencies until next day.

needed gasoline at Townsend and the shop closed. The whole party d on a still hunt through the village, fter an hour's search succeeded in ıg the proprietor. Groton was reached ut further mishap, and we dined at aint old inn, albeit paying well for aintness. Quaintness palls at modern .

en all were embarked for the start, ssistant chauffeur gaily inserted the and nearly pulled his shoulder out. ngine was stuck fast. For two hours led every part, from head-light to dif- ial, without appreciable improvement. y Mr. G., in his blind groping for a ly, unscrewed a nut in the crank case oured a large quantity of oil through ole. The engine presently loosened d was soon racing as merrily as ever. ɔund next day that an oil duct on the cting rod leading to the cylinder had n and allowed everything to get dry. leluge of oil must have reached the lty.

m that time on the car ran perfectly, we arrived home with not a thing , covering the last thirty-five miles in ıours and five minutes.

ee greenhorns had driven seventy-five and back without serious damage to ır men—fairly good evidence of the roof qualities of the car.

ɪme Steam Runabout Experiences.

By William Pullman.

using my light runabout, my first and st trouble is to keep up steam going st a head wind. I have tried several ıes to overcome this, but they do not very well. I made a sheet iron shield ıy fire-box, but the heavy wind seems use a down draught, so that the heat ire, instead of going up through the of the boiler, pass down through the r. The last thing I have tried seems ork better, however. I took a large of enamel rubber cloth, the width of agon body, and fastened it from the of the gasoline tank and down under ngine. This seems to help matters and I think that by using a large still better results could be obtained; anyway, the cloth keeps the engines, gearing and other working parts cleaner, and helps the working of the machine a whole lot.

I went from Freeport, L. I., to Long Beach, L. I., on the Fourth of July. Going down things worked very nicely, and I had no trouble to speak of, except that my pump did not seem to work very well, and I had to stop and pump up. So I took the top off the check next to the pump, and found the check stopped with dirt, which washed right out; then I put back the check and cap, and tightened up the gland a little, and the pump went all right after that. But coming back is where we had the fun.

EFFECT OF SALT WATER.

I could not get any water at the Beach, and as I thought I had enough to carry me back to a watering place some distance up the road, we started off; but as we got to the bridge, the draw was just opening for a couple of boats to go through, and we had to wait about twenty minutes, and when we got a mile farther, my water was gone, and something had to be done. There was no place where I could get fresh water for more than a mile around, so I decided to try a little salt water, and filled the tank with that. I then pumped up about half a glass of water, and we started, but had not gone more than a quarter of a mile before the water was gone again. It would all foam out as soon as I opened the throttle, and the engine, instead of cutting off at the proper places and times, would keep up a steady blow. You see, the salt steam ate all the grease off the valve seats and out of the cylinders, so that the engine leaked steam the same as a skimmer leaks water. So I had to take off the steam chest cover and squirt oil in the valves and into the steam ports, then put it on, and we would go a little ways. Then, when things got pretty bad again, I would do the same thing over again, and in this way I got to fresh water and filled up. Then things worked a little better, but not very much, as the salt had done its work pretty well.

ADVANTAGE OF PACKED PISTONS.

When I got home I blew off the boiler and took out all the checks and cleaned them, packed my pump over and cleaned up generally, and the machine worked fairly well again, but not as good as it should. The pistons leaked steam badly, and the engine consumed four times the steam it should, so I took it out of the vehicle and apart, and in taking out the pistons, I discovered that they were nothing but just plain plugs. So I swung them in the lathe in the shop and cut two grooves 3-16 inch wide by 1-8 inch deep in each piston, about ¼ inch apart; then wound these grooves full of dry candle wicking, and put the pistons back, and set the valves over so that the engine would have a more even cut off. Then I put the engine back and connected it up, and put a lot of oil in the valve chest, so that it would run into the engine as soon as it was warmed up.

The reason for putting the candle wicking on dry is, that as soon as it is wet it swells, and you could not get as much on wet as you could dry; and by putting it on dry, as soon as it becomes damp from the oil and steam, it swells and makes a tight joint, and works fairly good in the place of rings.

My machine works a hundred per cent better now than it did before I packed the pistons and set the valves over, and I think that by putting in cast iron rings in the engine, instead of the wicking, the machine will give still better satisfaction.

Drivers' Certificates in France.

The question as to the authority for issuing drivers' licenses has just been decided. Up to the present time these certificates have been issued by the Service des Mines, which has been for them no easy matter. Some little time ago the Government decided to transfer this duty to some automobile association offering all the necessary qualifications. The Association Générale Automobile has been chosen for the duty. It was first of all temporarily empowered to grant these certificates, and on July 23 the decision was formally ratified and rendered permanent. In future, anyone who wishes to obtain the necessary permission, must present himself at the Association Générale Automobile, provided with all the necessary documents. After a theoretical and practical examination by an engineer, the certificate will be delivered to the capable candidate on the following day. This appears to be a very simple solution of the whole matter, and it will be interesting to see whether it works satisfactorily.—*Autocar.*

Aluminum does not readily lend itself to plating, because the plated metal tends quickly to scale off, and the defect has been attributed to the microscopically thin film of oxide which forms on the surface of the aluminum. A new method of dealing with the metal is to immerse it in soluble fluorides, together with some free hydrofluoric acid; and thus not only to remove the oxide film, but to prepare the surface of the aluminum for the reception of a plate of other metal by roughening its surface. The aluminum is then quickly rinsed and immersed in a bath of zinc and aluminum sulphates, and while in the bath a film of zinc is deposited on it by the ordinary methods of electro-plating. Other metals may now be plated on the zinc. An electrolytic film of gold will, however, disappear in the zinc, so that if it is required to give a gold plating to the aluminum zinc surface the surface must further be coated with copper.

New Vehicles and Parts

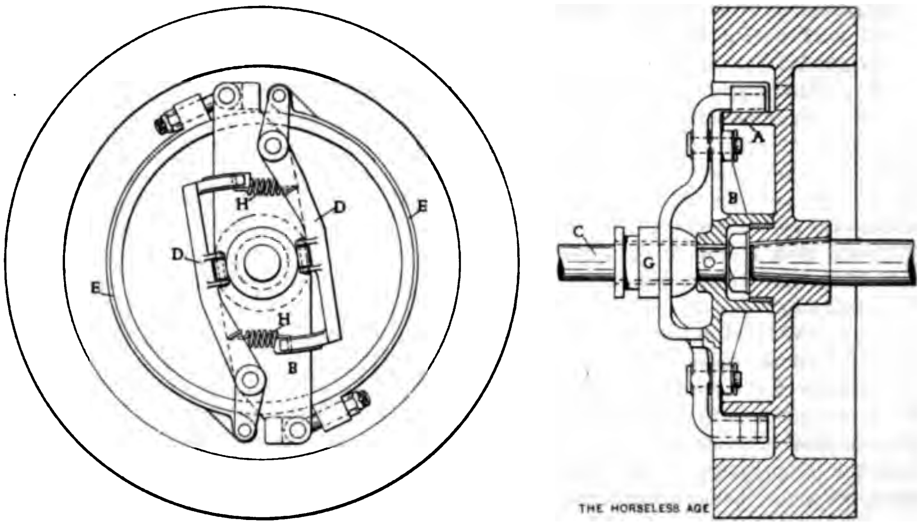
Whiting Gasoline Truck.

The Whiting Foundry Equipment Co., of Harvey, Ill., have recently completed a five ton gasoline truck, which is shown by the illustrations herewith. It will be noticed that the engine and change speed gear are in accordance with the latest practice in touring car design, and it may be said that the appearance of the vehicle marks, in a way, a new period in the construction of heavy goods vehicles.

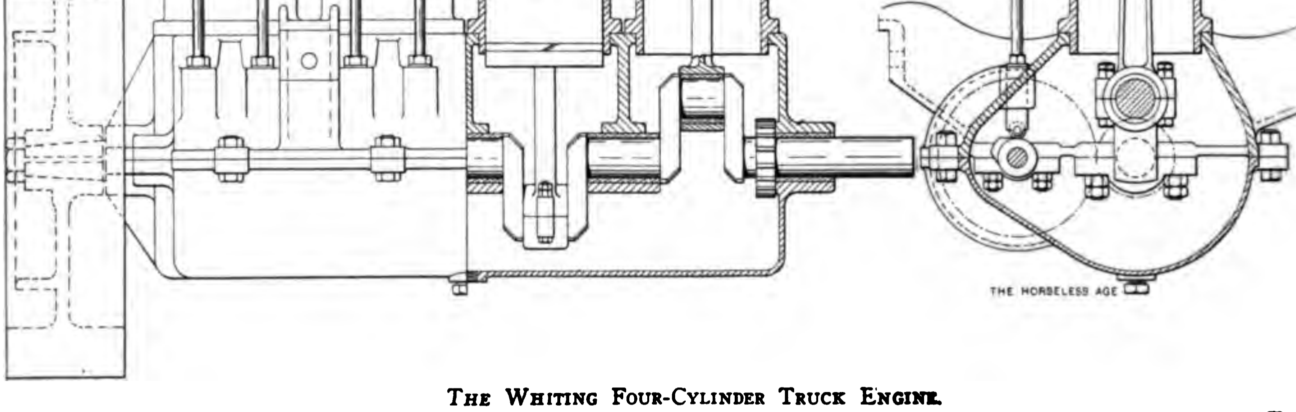
The engine is a four cylinder vertical one, and is located in front centrally over the front axle. The engine is of 6 in. bore and 6 in. stroke, and is claimed to develop 35 h. p. at 950 r. p. m. It is very flexible, and the speed can be varied from 125 to 1,000 r. p. m. by means of the throttle. The inlet and exhaust valves are located in the cylinder head, opening directly into the cylinder, and are interchangeable with each other. Patents on the design of the valve are now pending. A special advantage of the valve arrangement is that in case one of the valves needs grinding, it is not necessary to stop for this on the road, but simply to take out the valve cage as a whole, and replace it with a new one, which is the work of a few minutes. The engine is fitted with jump spark ignition, but provision is made to fit make-and-break igniters in addition, if desired. The ignition current is furnished by a six-volt storage battery of 70 ampere hours capacity, and a large six-cell dry battery is carried as a reserve.

Special attention has been paid to the cooling problem, which in a car with such a large engine and traveling only at slow speed, is not an easy one. The radiator is located in front partly below the platform, and has a fan located back of it. It is claimed that the radiating capacity is sufficiently large that the vehicle may be run with full load for an hour without boiling the water or overheating the parts. The crankshaft is of very substantial design, and is supported in five bearings. The connecting rods are drop forgings and bronze bushed at both ends. Engine lubrication is effected by means of a McCanna mechanical sight feed lubricator with eight feeds—one to each of the cylinders, and one to each of the connecting rods.

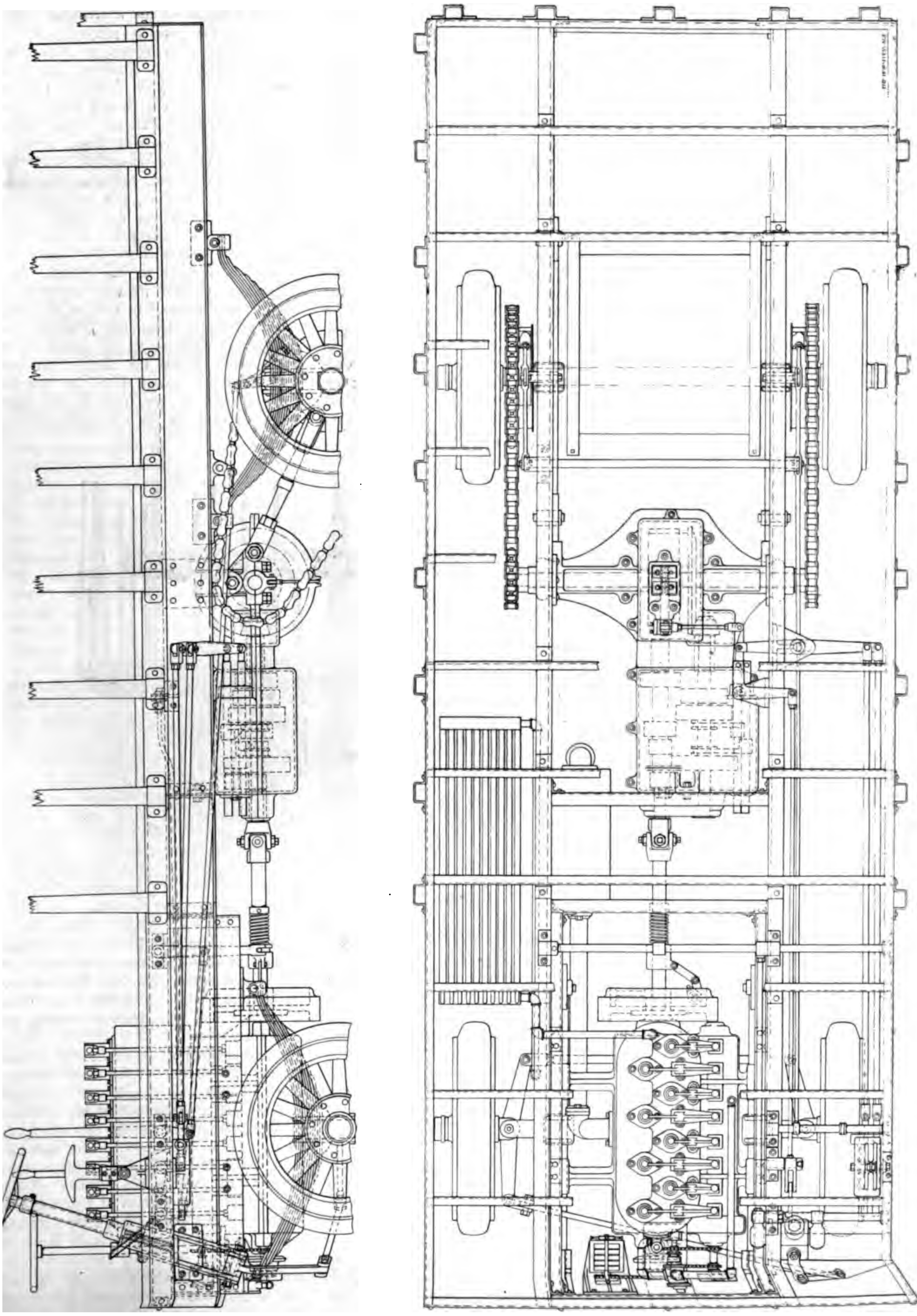
The clutch, which is illustrated herewith, is of novel design, and patents on it have been applied for. The clutch drum consists of a radial flange A on the flywheel. A two-arm radial bracket B is keyed and pinned to the end of the clutch shaft C Near the outer ends of the arms of this bracket are pivoted the levers DD by means of which the clutch bands EE are tightened on the clutch drum. These bands are secured at their opposite ends to the outer ends of the bracket B by means of adjustable eye bolts. The levers D are provided with rollers bearing on the conical collar G slidable on the clutch shaft C, and are drawn toward the clutch shaft by means of coiled springs HH. The operation of the clutch is self-evident. The friction surface of the clutch is metal to metal, and it is claimed to require very little attention or adjustment.



Whiting Friction Clutch.



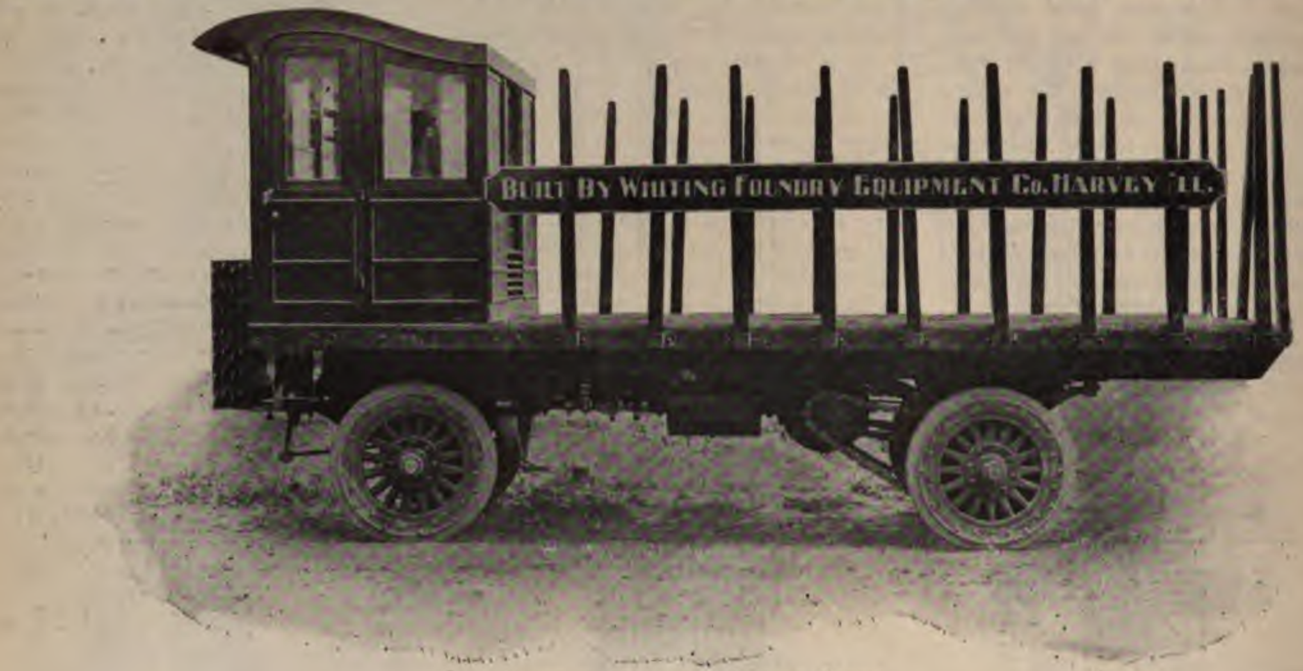
The Whiting Four-Cylinder Truck Engine.



ELEVATION AND PLAN OF WHITING FIVE-TON GASOLINE TRUCK.

The change speed gear is of the standard sliding pinion type, and is made exceptionally heavy. All the gears are of four pitch and 2½ inch width of face, and the teeth are case hardened. The gear gives three forward speeds and one reverse, the maximum speed being six miles per hour. A large and strong differential gear is mounted on the countershaft, from which the power is transmitted to the rear wheels by separate chains which are tested to 25,000 lbs. each. The transmission gears run in oil, and all bearings are provided with large grease cups.

The frame is constructed of section steel and supported on very substantial semi-elliptic springs both in front and rear. The wheels are of the Archibald wood type 36 inches in diameter, and fitted with solid rubber tires, although steel or wood tires may be substituted if desired. The platform can be built to suit the special requirements of customers.



WHITING FIVE-TON GASOLINE TRUCK.

The carburetor is designed to use low grade gasoline costing less than 10 cents per gallon, and provision is made for long non-stop runs, the gasoline tank having a capacity of 40 gallons. The lubricator holds about a gallon and a half. It is claimed that an average speed of five miles per hour is easily maintained, and that a total distance of 50 miles may be made in a ten-hour day, at an estimated cost of one cent per ton mile for fuel. The weight of the truck without load is five tons.

The Churcher Alternating Current Rectifier.

A device which will undoubtedly prove a convenience to many users of electric automobiles, has recently been placed on the market by the Electric Appliance Co., of Cincinnati, O. We refer to the Churcher alternating current rectifier for charging vehicle batteries from alternating supply circuits, which was illustrated in our last issue (Fig. 3, page 147). This device is based on the principle that an electrolytic cell with one aluminum electrode will pass only one phase of an alternating current. Rectifiers on this principle have been constructed for several years according to different designs, but not much success seems to have been achieved in their use. The Churcher rectifier is claimed to be an improvement over the earlier devices of this kind, and to overcome all their objectionable features.

This device rectifies both waves of any alternating current and requires but one jar, one solution and one set of electrodes to do so. In this way the internal resistance is reduced to a very low point, in fact, is only limited by mechanical necessities to prevent short circuits. The principal loss that does take place is the leakage current. This current does not pass through the apparatus operated by rectified current, but is expended in heating the solution. This loss is largely dependent upon the electrode potential at the film, the purity of the aluminum and solution and its temperature. Where continuous service is required of the rectifier, it is therefore imperative to prevent this initial rise in temperature by the use of water cooling pipes or radiation of some sort.

This form of rectifier requires the use of a transformer with a secondary of twice the direct current voltage required, plus the resistance loss. This secondary coil is tapped in the center and by virtue of the action of the rectifier, this tap remains positive at all times to one or the other extreme terminal. The active electrodes are attached to each of the extreme secondary terminals, the number depending upon the phase of the alternating supply. Owing to the peculiar properties of the films on these electrodes, no appreciable current passes from either to the other. Electrodes of inactive material, such as platinum, carbon, etc., would short circuit the transformer. Between these active electrodes, but insulated from them, is placed an inactive electrode, preferably platinum. Connected between this electrode as one terminal, and the center tap of the transformer as the other, is the battery to be charged. In operation the current passes from the center tap of the transformer to the motor, from the motor to the inactive electrode in the rectifier solution, to one or the other active electrodes, depending on which is at that instant negative to the center of the transformer. Inside the rectifier the current therefore passes from the inactive electrode first to one, then to the other active electrode as the alternations of the cycle take place, the center of the transformer remaining positive at all times. It will be understood from this that one side of the transformer is active while the other is inactive and then reversed during the next alternation.

The regulation of direct current is best attained by placing an adjustable inductance between the transformer terminals and the active electrodes of the rectifier. This regulation can also be very efficiently attained by an inductance in the main alternating supply, or by varying the number of turns of wire in the primary of the transformer. Either form of regulation is, of course, much more efficient than placing resistance in series with storage batteries when charging from 110 volt direct current mains. It is also a well known fact that a pulsating unidirectional current is

especially desirable for charging storage batteries. Just why it is so, is not very well understood, but the fact remains.

The practical limit of voltage of one cell of the Churcher rectifier is about 50 volts direct current at full ampere load, or a difference of potential across the active electrodes of about 130 volts. Somewhat higher voltage may be obtained under favorable conditions, but the efficiency is generally much lower, because of the increased leakage from one transformer terminal to the other. Through the use of two cells and two secondaries in the one transformer, twice the voltage can be obtained; three cells with three secondaries in the one transformer will give three times the voltage, etc.

The Fischer Observation Automobile.

The sightseeing business is comparatively new and seems to go hand in hand with the auto. Many of the passengers carried on a sight-seeing tour have two new experiences—that of seeing the city and riding in an automobile. Heretofore in the vehicles built for this business the seats have been on a level, or, in other words, the first passengers got the better seats, and, consequently, the better view. In the vehicle herewith illustrated, built by the Fischer Motor Vehicle Co. of Hoboken, N. J., and operated in New York City, every passenger has an unobstructed view or box seat whether he comes first or last. In size and seating capacity the manufacturers believe this to be the largest automobile ever completed which went into active service.

The company's patent covers the terracing of each seat. In this vehicle each seat is terraced about 5 in. above the one just in front of it; furthermore, in loading, the centre of each seat is removed, the last seat excepted, and the passengers are allowed to enter from the front or that part of the vehicle nearest mother earth.

There are eight rows of seats, each seating five passengers comfortably, but in case of emergency six passengers could ride in each seat—making the total load forty-six (46) passengers, exclusive of the operator.

Another point very much in favor of the terrace is that with the seats arranged as they are, the auto has a sightly appearance, thus doing away with the "flat car" effect of other vehicles in general use for sightseeing purposes. The raise in the seats permits of ample room to put the machinery underneath in the rear, thus doing away with the occasional smell coming from the engine, and reducing the noise to a minimum.

The terrace car in question is the first of four that the company are building for the New York Auto Transfer Co., the general dimensions of which are as follows: Length, 18 ft. 6 in.; width, 7 ft. 7 in.; wheel base, 10 ft. 3 in.; gauge, 6 ft. 5 in.; weight (empty), 13,000 lbs.; speed, 10 m. p. h.

The equipment throughout is the regular Fischer combination system, and the general construction of the chassis is similar to that of other heavy vehicles built by this company.

The frame is built up of channel steel. Wheels are of the artillery type made of wood with solid rubber tires—36 in. x 6 in. front and 42 in. x 7 in. rear. The front axle is built up of wrought iron on the bridge truss principle, giving the greatest possible strength for the amount of material used. The rear axle consists of a diamond-shaped steel frame supporting two electric motors, necessary gears, housing for same, spring saddles, brake mechanism and live axles, all making a complete self-contained driving unit, partially resting on the rear wheels and partially spring suspended from the body of the vehicle. The front springs are of the platform type and the rear ones are half elliptic. Steering is done by means of a horizontal hand wheel operated through a pinion rack, and connecting rod to knuckle arm.

Fischer Observation Automobile.

The engine is a 4 cyl. (5½ in. x 6½ in.), opposed horizontal cylinders, 550 r. p. m. Jump spark ignition is used, with induction coil near engine but operated from driver's seat. Lubrication is effected by means of a positive feed capillary-mechanical oiler driven direct from the engine. The crank case of the engine is extended so as to form a sub-base for a 10 k. w. 120 volt shunt wound dynamo, thus making a complete self-contained generating unit. An automatic magnetic throttle governs the engine according to the demands of the motors regardless of the speed of the vehicle. The battery consists of forty-eight cells with a capacity of 136 ampere hours at a three-hour rate. The motors are 7½ h. p. each, series wound, and will stand an overload of 200 per cent. for a half hour or 100 per cent. for an hour. Weston volt and ammeters are used. The gasoline tank has a capacity of twenty-eight gallons, or sufficient for a run of ninety to one hundred miles, depending upon the condition of the roads.

The "Hawkeye" Refrigerator Lunch Basket.

Tourists in sparsely settled districts are often unable to find suitable hotel accommodations at meal hours, and it is said that the practice of taking along lunches and picnicking at the roadside is spreading. In order that the lunch may be kept fresh and palatable, some refrigerator arrangement must be provided on the car. A basket which apparently serves the purpose in every particular is made by the Burlington Basket Company of Burlington, Ia. It is made of best rattan and provided with a watertight non-rustful metal lining, the space between the rattan and the metal being filled in with heat insulating material, asbestos and hair felt. A metal ice chest is provided to fit inside one end of the metal lining of the basket in such a way that it can readily be removed when the basket is to be cleaned. The cover of the basket is made in two halves turning on hinges in the center. It is also lined with metal, felt and asbestos, and a strip of felt running around the outer edge of the cover makes the basket perfectly watertight and retards the melting of the ice. The top of the basket is finished with hard oil, and the bottom is given a heavy coat of moisture resisting paint. It is claimed that a small amount of ice will keep the contents of the basket at from 57 to 58 degrees for a period of twenty-four hours.

MAINTENANCE AND REPAIRS

The Care of Tires in Use---Wear Due to Faults in Car.

Even with careful operation, the tire item will form a goodly portion of the total expense in the operation of a car, and through carelessness and inattention, it may easily become as great, or even greater, than all the other running expenses added together. It devolves, therefore, upon the motorist to give the tires every consideration, and to apply every means calculated to prolong their life. Natural wear, of course, cannot be altogether prevented, but as unnecessary wear may result from many causes, a study into these causes should prove beneficial, and enable the observer to take remedial measures, and to avoid such wear by constantly watching for its causes. Unnecessary wear of the tires may be caused in many different ways, but results from nothing more frequently than an improper condition or adjustment of certain parts of the car. These usually are not found in a car when new, but develop as the machine is used.

IMPROPER ALIGNMENT OF WHEELS.

By far the most prevalent of these causes is the improper relationship of the steering wheels, due to the bending of the steering arms or of the connecting rod between the wheels, either of which will make it impossible to bring the wheel into planes parallel with each other and with the longitudinal center line of the frame of the car. A dragging of either one or both of the tires of these wheels over the ground will result, which will rapidly wear the outside layer of rubber on the outer shoe at the tread portion or point of contact with the ground.

If the plane in which the wheel rotates is not parallel with the line of motion of the car as a whole, the tendency of the wheel to travel in two directions at the same time causes this dragging, and the wear will occur in lines across the tread at an angle equal to the angle of error in the position of the wheel.

If it is discovered that the steering mechanism is in the condition indicated above, great care should be taken to accurately locate the cause of the trouble before any effort is made to rectify it. Even if a steering arm is bent, it is possible to bring the wheels parallel with each other by adjusting the connecting rod, but such correction holds only for travel in a straight line, and as the steering angle has been disturbed, dragging and wear will occur in turning corners. In such a case the steering arm should be brought to its proper position, and the connecting rod, if it is not bent, will then bring the wheels into their normal position.

If the front axle shifts on the springs, so that one side is nearer the front end than the other, it will become impossible to bring the wheels parallel with each other when the car is traveling in a straight line, and wear on the tires will result, the same as in the cases cited above. In this case the wheel bearings will be in line with the axle—which position is the only one in which the wheels are parallel with each other—only when the wheels are out of parallel with the frame of the car and not pointed for travel in a straight line. In holding the car in this direction, a sort of compromise is reached between the two wheels, and the dragging which causes wear occurs.

ALIGNMENT OF REAR AXLE.

The rear axle should also be maintained in a position at right angles with the longitudinal center line of the frame. A slight variation may cause increased wear on the driving tires, while a considerable variation will throw this wear on to the tires of the steering wheels. This will result from the fact that in order to move in a straight line, the car must travel "crab fashion," with the front and rear wheels not tracking. To correct the effect on the steering, a turn must be given to the steering wheels, and they will therefore be thrown out of parallel.

If the car is fitted with chain drive, and has a distance rod at each side, great care should be taken in adjusting these, to see that they are taken up or let out the same amount, so that the relative position of the axle will not change.

In the case of cars fitted with bevel gear drive, it sometimes happens that the clips over the springs become loosened, with the result that the axle shifts along the springs unevenly. Any such "shifting" should, of course, be corrected before the clips are tightened again.

MUD GUARD BOLTS.

Many tires have been injured by being cut by the bolts by which the guards over the wheels are attached. If insufficient clearance is provided at the start; if the springs settle from long use, or if the guard supports become bent, it may happen that these bolts will rub the tire as the springs work up and down under a heavy load. Such wear is very rapid, and a single run may ruin a tire. It is most apt to occur when the car is loaded to a considerable degree beyond the normal, either with passengers for a short run, or with baggage for touring. It is, of course, true that the guards should not strike the tires, even if the springs be forced down to the absolute limit, but such, unfortunately, is not always the case.

EFFECT OF BRAKES.

The condition of the brakes has much to do in an indirect way with unnecessary wear on the tires. In nearly all cars of the present day, the brake which is habitually used is so located that the braking action is transmitted through the differential and distributed evenly between the two road wheels. Braking shocks are consequently divided, but even so, if the conditions of the braking surfaces, or the means of applying the braking effort, is such that a gradual braking effect cannot be produced, the wheels will come to a stop sooner than they should, and will skid along the surface of the road, much to the detriment of the tires.

Emergency brakes are usually fitted to the hubs, and are used much more than their name would imply. They should, therefore, be taken into consideration in a discussion of this sort. Their action is not balanced by the differential group, and it is, therefore, necessary to provide some other means of doing this. If an equalizing device is fitted to them, the braking tension is distributed evenly between the wheels; but if the braking surfaces are of different character, due to the presence of grease or grit, the braking effect will vary accordingly, and one wheel will be retarded quicker than the other, and will therefore receive practically the whole of the braking shock. These surfaces should be kept in as nearly the same condition as is possible, and if no equalizing device is supplied, the length of the rod or wires connecting to these brakes should be such that the pressure applied to the brake handle is divided evenly between the two brakes.

EFFECT OF GRIPPING CLUTCH.

Another cause for unnecessary wear on the driving tires, which is peculiar to the gasoline car, is what is called a "gripping" clutch. If through faulty adjustment, an improper condition of the frictional surfaces, or a poor controlling device, it is impossible to allow the clutch to grip gradually, the shock which is transmitted through the entire transmission system, due to this sudden seizing, is finally delivered at the tires, and, besides subjecting them to a sudden strain, which tends to tear the rubber from the fabric, may cause them to skid and thereby wear at the point of contact with the ground.

EFFECT OF OIL.

The construction of some cars, and the carelessness of the owners of some others, make it possible for oil to reach the tires and accumulate thereon. It is undoubtedly unnecessary to state that oil is extremely injurious to rubber, and if its reaching the tires cannot be prevented, its accumulation should not be permitted.

Enclosed live axles are very often filled too full of oil, with the result that when an incline in the road is reached it works out through one outside bearing and down the spokes to the tire. To remove oil from a tire, the safest method is to first wipe it off carefully with a dry cloth, and after this rub the parts, which were covered, with French chalk. The chalk should be dusted onto the cloth and rubbed vigorously over the tire.

or Transportation in Undeveloped Countries.

ere is no doubt a great field open for road wagons for passenger and goods ortation in such countries as Mexico, Africa, the West Indies, the Philip- and certain South American coun- where the construction of railroads ade little progress, owing to the great (due largely to the fact that all ma- must be shipped from a great dis-) and the insufficient volume of traf- he construction of railroads in such ries is greatly hampered by the enor- risks involved, as when a line proves fitable, the capital sunk in it is prac- a total loss. The natural conse- e is that in many of these countries ansportation facilities are exceedingly ive, and the exploitation of the re- es of these countries is greatly ham- It is therefore little wonder that in- s are frequently received from these ries for motor-propelled omnibuses, trucks for transportation from and nes, etc.; and in reality considerable ess has already been made in estab- g motor transport services in semi- ed countries, when the slow develop- of this business in the motor-produc- untries is considered. Passenger ser- by automobile are now in operation, istance, in Peru, Porto Rico, Tunis. Africa and Madagascar. The ser- n Porto Rico is due to private initia- ut the African lines are operated by spective governments.

line between Susa and Sfax in Tunis een in operation for over two years.

KNOX WAGON IN USE IN PORTO RICO.

at on Madagascar, between Matasara auanarive, since June 1, 1903. The in Tunis are excellent, which has un- edly helped much to make the service a success, but the route of the Mada- line is very hilly, although it also niformly good surface, being of only construction. The hilly nature of the together with the hot climate, probably explains why such an enormous radiator is used on the cars employed in the service, one of which is illustrated herewith. The following particulars of this service are taken from a recent report of Captain Gruss, manager of the line, to the Governor-General of the island:

PANHARD WAGON IN USE IN MADAGASCAR.

The total distance between the two end stations is 250 km. (150 miles), making the round trip 300 miles. One section of about ten miles is exceptionally hilly, yet the grades never exceed 9 per cent. In this section much care is required on the part of the drivers to prevent collisions with horse vehicles and push carts, particularly as sharp turns abound. The entire route has a fine roadbed at present, but the hilly section will need continual attention, as owing to the frequent heavy rains and the clayey nature of the soil, the least inattention in their maintenance may result in serious damage.

The rolling stock consists of six 15-h.p. truck and two 12-h.p. breaks transformed into trucks. All are of Panhard-Levassor construction. This equipment has recently become insufficient, and an increase in the number of vehicles is contemplated.

The vehicles have proven thoroughly satisfactory, although some repair work and adjusting is required at the end of each journey, and it has been found necessary to install several repair shops along the route.

The drivers are picked from the Colonial Infantry and Artillery and from the Foreign Legion, and have all received more or less mechanical training. When at the stations, they help in dismounting and reassembling vehicles under repair. Theoretical knowledge regarding the operation of gasoline motors and automobiles is imparted to them by the master mechanics. Much care is exercised in training these men to become skilled and self-reliant drivers. The first three or four months' instruction are given on an old vehicle, and the whole term of training lasts from eight to twelve months. It is thought to be largely due to this careful training of the drivers that there have been practically no collisions or similar accidents in the first seven months of operation. The management has also made arrangements to provide suitable food and lodging for the drivers at all stations.

A bi-weekly service is maintained between the two end stations, the single trip of 150 miles being regularly accomplished in two days, the average running time being 22 hours. The average load carried is 1,500 pounds of mail matter and two passengers. In addition to this bi-weekly service, a vehicle runs from Tauanarive on the first of each month and from Beforona on the sixteenth, for Mahatara, to make connection with the mail steamer leaving from there for France.

During the seven months that the service has been in operation, the vehicles have cov-

ered in the aggregate 28,000 miles, and have carried 106 tons of express goods, 180 passengers and 7 tons of baggage belonging to these. The total expenses during this period were 121,000 francs, or about $20,000.

A similar service with American vehicles is in operation in Porto Rico, and has been referred to several times in these pages. It is in charge of C. H. Martin and seems to be successful in every way. A new vehicle of a larger type, herewith illustrated, has recently been added to the equipment. The car is an air-cooled Knox, and is the fourth of this make now in use in this service. It has two cylinders and carries fifteen people, besides mail and baggage. The wheel base is 96 inches, with 56-inch tread. The wheels are fitted with 4-inch solid rubber tires. There are two folding side racks that let down for carrying baggage, also one that lets down in front for carrying mail. The weight complete, including racks and top, is 3,580 pounds.

Petroleum in Canada.

(From United States Consul-General Holloway, Halifax, Nova Scotia.)

The bounty of 1½ cents a gallon on crude oil recently granted by the Dominion government has stimulated the development of oil territory, and the business men of the Maritime Provinces are congratulating each other over the development of the New Brunswick oil field. A New Brunswick petroleum company has found oil in paying quantities in a district extending many square miles, over an area as extensive as the petroleum oil field of Ontario. The company has 34 wells now producing at the rate of 50 barrels of oil daily. This is much in excess of the product of the Ontario wells and the oil is better. The company has emerged from the experimental stage and is now busy multiplying its wells (11 more wells will soon be producing) and erecting storage tanks. The storage tanks are being built on a strip of land between Merramcook station and the river. They will form the nucleus of the refinery to which the oil will be brought by gravitation through pipe lines; and crude, refined, and other oils and by-products will be dispatched by rail and water.

The operations of the New Brunswick company resemble those in the natural gas fields of England, where petroleum oil has been struck and illuminating, heating and cooking gas is being supplied to 70 to 80 houses and to the street lamps, and preparations are being made to supply neighboring gas works. Dr. Boverton Redwood classifies the New Brunswick oil fields as among the promising fields of the world.

T. J. Burwell received his new steam automobile last week and since the date of its arrival most of the gentleman's spare time has been taken up in an effort to look inside and see what makes it go.—Harvey (N. D.) *Herald.*

COMMUNICATIONS

Tire Inflation Pressures.

Editor Horseless Age:

I do not like to criticise a fellow tradesman, for it is not polite, but when a good friend goes wrong, he ought to be rounded up and headed the right way, and Mr. Grossman is certainly wrong on the subject of tire pressure. I have spent about $5,000 in experimental work on pneumatic tires since they first came before the public and recognize the fact that the more I learn the less I know. Mr. G.'s definite information as to the proper pressure for a tire therefore provokes a smile. I drove yesterday, for example, one rig, weighing more than a ton with 2½ in. tires on 30 in. wheels; another rig weighing about half as much with 3 in. tires on 36 in. wheels, and I am quite sure that his instructions to pump both these tires "63 to 75 lbs. pressure" would leave one of them far too soft to carry the heavy load. I also happen to know (for I pumped one) that the valve of one of those tires offers a resistance in the neighborhood of 50 lbs. per inch, so if I had used a pump with a gauge on it, and stopped at 75 lbs., the tire would not have contained enough air to carry the weight of its own wheel, let alone its share of the vehicle. The proper pressure in a tire is that required to carry the load without danger of bumping the rim, when a rock or similar obstacle is run over at speed. The object of the pneumatic tire is to swallow small obstacles and save vibration being transmitted to the vehicle. If pumped too hard, they do not yield under a load, and this result is not obtained, while if not pumped hard enough, the tube is pinched and the tire and rim damaged on hard bumps; and the number of pounds pressure depends not only upon the size of the tire, both in section and diameter, but also upon the load carried and upon the quality of the roads. It is quite evident that the surface of the tire in contact with the ground, multiplied by the pounds pressure of air against that surface must equal the load carried by that surface.

His advice to let out the hot air and pump in cold is certainly the limit. Every school boy knows that compressing air heats it, with the result that a tire pump after a few strokes is so hot where the air leaves it, that it will burn one's hand. The small amount of heat contained in the air in a tire is of little importance anyhow. Fortunately most people do not like to work, and they prefer to let the tires cool off while they sit under a shady tree and think about the time required to let out the hot air and pump in some still hotter.

Chas. E. Duryea.

Racing in the St. Louis Tour.

Editor Horseless Age:

My attention to-day has been called to your issue of August 10th, containing an account of our St. Louis tour and an editorial thereon.

I most respectfully advise you that the statements in regard to racing, etc., on which you base your criticism, are wholly false, and I am utterly amazed that you should publish them without investigation.

I request you to publish this letter, not because it is necessary to tell the friends of the participants in the tour that the statements are false, but for the benefit of those who do not know us personally and who might perhaps believe them.

This tour was the most successful one ever held from the standpoint of good behavior on the road, good fellowship toward each other of the participants, and evidence of the reliability of the cars under all touring conditions.

Harlan W. Whipple,
Pres. American Automobile Association.

[Our criticism was based on the reports of our own representative and of those of practically all the newspaper men on the tour, many of whom rode in cars and therefore certainly knew what they were writing about. There is unlimited evidence that there was racing in practically every stage of the tour. We will only mention the New York *Herald* reports, especially that of the run from Erie to Cleveland. If this does not suffice, we can quote at least a dozen other writers on the tour to the effect that there was racing. The newspaper men were there to investigate, and that is all the "investigation" necessary. There may have been plenty of good fellowship between participants, and the tour certainly furnished evidence of reliability of the cars, but as a demonstration of good behavior on the road it was an absolute failure. The criticism we passed on the tour was more than deserved.—Ed.]

Complains of Agent's Indifference.

Editor Horseless Age:

It may be a delicate proposition to ask a paper which derives its income from automobile makers to take them to task, but no doubt subscribers also come in for a goodly share of your consideration, and I want to call your attention to one subject wherein your journal can be of assistance, viz.:

What precautions can a purchaser of an automobile take to secure some consideration from the sellers after they have laid hands on his check?

My experience in two cases has been that the buyer "cuts no ice" with the agent after the machine has once been paid for, and whether the machine gives satisfaction or not is, or at least appears to be, a matter

of almost indifference on the part of the agent. In this experience I am not alone. Upon comparing notes with half a dozen other owners, I find their experience has been the same, with one exception, which is so noteworthy that it really deserves specific mention.

This exception is where the makers (who are some distance from New York) have sent an expert to every purchaser to see if the machine is running satisfactorily; what the troubles are (if any), and giving hints as to running and care of the machine. In addition to this, frequent circular letters are sent to every owner, giving hints on this point and on that, and in this way are of much assistance to the buyer; and, from their point of view, make their machine a success.

Perhaps I should explain that I live in the country, about twenty miles from New York, and it may be that metropolitan owners, who can vent their troubles by word of mouth, get better treatment.

"KICKER."

The Turnpike Rate Controversy in Cincinnati.

Editor HORSELESS AGE:

In a recent communication to your journal, the writer called attention to the action of the Alexandria Turnpike Company in advancing the toll rates for automobiles over their pike to one cent a mile for each horsepower of car. As indicated in that communication, the Board of Governors of the A. C. of Cincinnati instructed its secretary to address a communication to F. C. Miller, the President of the Turnpike Co., protesting against this exorbitant rate.

It cannot be said in this case that the action of the Turnpike Co. is that of a lot of farmers who have a feeling of antipathy for automobiles in general, and who would like to see them driven from the face of the earth, because two members of this company are themselves enthusiastic automobilists; F. C. Miller, the president of the company, being one of the pioneer automobilists in this vicinity and having served last year as president of the A. C. of Cincinnati.

In reply to the protest sent him by the Cincinnati Club, Mr. Miller sent the Secretary of the Club the communication of which I send you a copy. The Alexandria Turnpike being an exceptionally fine piece of roadway, undoubtedly many automobilists have indulged in a rate of speed over it calculated to make it hazardous for other users of the pike. It is true that several accidents have happened on this pike, due to horses frightening at automobiles, the same thing has probably occurred on all other pikes since automobiles have come into general use. Scripture warns us that "a horse is a vain thing for safety," and the probabilities are very strong that some horses will continue to frighten at the automobile for some years to come. How much the speed of the automobiles has to do with the degree of the fright we are not prepared to say. The only time the writer's automobile caused a horse to run away was when the machine was standing at the side of a street without even the motor running. A horse attached to a light runabout coming suddenly around a corner and seeing the automobile, suddenly left the street entirely and gave his driver a short but exciting ride through the front yards of several nearby residences. However, we believe that automobilists, for their own protection, will do well to slow down when passing frightened animals, otherwise the claim will often be advanced that the speed being excessive caused the horses to frighten.

Because some drivers of automobiles will insist on riding through the country at a rate of speed greatly in excess of the maximum permitted by law, it is to be expected that owners of turnpikes will take steps to keep the automobiles off its road if possible.

The best way for the automobilist to secure respect for his own rights is to show a proper respect for the rights of other users of the road. New innovations, as a rule, are not accepted kindly by the masses, and a campaign of education must be conducted along rational lines if we wish to avoid strenuous opposition.

While we do not agree with the justness of the claims as set forth by the President of the Alexandria Turnpike Co. in his communication in regard to their action, nevertheless we submit his letter to the readers of the HORSELESS AGE in order that the other side of the question may be properly set forth, and trusting that the whole question of speed may be so regulated as to be just to all and inflict hardship upon none. We believe the officers of the automobile clubs of the United States should lend their assistance to the proper authorities to bring about a proper compliance with the speed regulations, and not be guilty of violating them so defiantly as was done on the recent automobile tour to St. Louis.

Following is a copy of the letter of the Alexandria Turnpike Co.'s President:

"I have your letter of the 4th, also inclosure of Mr. Klein's letter. In reply will say that the pike company had innumerable complaints against automobiles on the road. As these complaints come from the people on whom we have to depend for necessary income to keep the road in proper repair and to pay the stockholders' dividends, it was proper on our part to pay some attention to them. We had reports from our superintendent at nearly every meeting of the Board for more than a year past. All reports are invariably against the use of automobiles on the road as now used. He reports that attempts on his part to stop the drivers of automobiles when dashing over the road at break-neck speed are met with derision by the drivers. We were forced at last to do something to make travel over our road safe for all classes of vehicles. It was moved by a member of our Board, also a member of your club, to charge automobiles the same rate of toll that is charged for horse-drawn vehicles, the horse power of the automobiles to take place of the horse in other vehicles. For your further information I will say that I have just had a report from our Supt. of a case that happened July 23rd, when a driver of an automobile rushed our first gate, paying no attention, and later frightened a farmer's horse, causing a broken wheel to his wagon. The automobile had the letters J. L. C., and is said to belong to . . . I fear that careless automobiling will result in banishing them from our roads by law.—F. C. Miller."

L. S. C.

Electric Vehicle Batteries.

Editor HORSELESS AGE:

I presume there are a good many who, like myself, are interested in the electric vehicle, and, strange to say, there is hardly any mention made in your valuable paper of the electric machines. It seems to be the opinion of most of the people who are interested in the auto that the electric should be the prevailing machine, providing there could be more mileage attained. There are those who want to go at break-neck speed, make all the noise they can, get into all the trouble they can, with an endless series of breakdowns and expense; but the great majority want their machines for pleasure. What has been done in the advancement of the electric battery to get more mileage without adding more bulk and weight? I am the owner of a very fine electric machine and am very much interested in the future of the electric battery.

W. W. CURTIN.

(So far as we know, very little has been accomplished in this line in the last few years, and the general impression seems to be that the lead storage battery has practically reached the limit of its perfection. In case any new batteries are brought out, we shall try to give thorough descriptions of same; and we devoted a good deal of space, for instance, to the Edison battery some years ago. Nothing radically new has been produced in the storage battery line during the last two years, and slight variations in the design of the plates or in the process of manufacture, by which means some improvement may have been achieved, hardly ever get out of the shops. There have been no public competitions for storage batteries or electric vehicles, so that it is impossible to say definitely what results have been obtained in the efforts to improve automobile storage batteries.—ED.)

Popping Burner.

Editor Horseless Age:

Answering Mr. Jno. S. Adams' inquiry in your last issue: Unless the pilot fire in the Melrose burner shows a clear blue, burns with a frying sort of sound, and has a cushion-looking flame with no yellow tips to each jet, it is not hot enough to do good work and will go out often. If there are yellow tips there is too much oil. The remedy is to reduce the needle hole in inner end of the pilot tube by upsetting it with a few light hammer blows. The needle point on the spindle in this tube frequently burns off; I replace mine with a common needle after drawing the temper so as not to break it while inserting. I find 30 pounds pressure in the pilot tank is the best.

A portion of the vaporizing tube to the main fire (about 12 inches) is heated by the pilot fire, and it is this short portion that furnishes vapor to start the main fire. Unless the latter is hot it will not vaporize the oil when let on, and a stream of clear oil then rushes into the mixing tube and thence into the bottom of the burner case, and it is this which explodes and, if excessive, burns with a fierce flame issuing from the chimney. Always let on the oil to the main fire slowly, so as to not cool off the part of this tube above the pilot fire, and as the main fire starts it heats the rest of the vaporizing tube (some five feet or so) and more oil can then be supplied. The fire door had best be left open each time the main fire is started, as this prevents explosions.

Mr. Adams may have a leak in the vaporizing tube. He should examine the blue flame of his main fire carefully, and if it is yellow in any spot, there is probably a leak near that place. The tube in the burner I have used is of common black iron piping and the butt-welded seam opened by the severe treatment it got at the hands of its makers, who bent it cold, shows plainly. I had serious trouble from this cause, and could not locate it until I took off the burner and filled the tube with gasoline when the leak was quickly perceptible.

The asbestos swab torch furnished with these burners is a foolish sort of tool to start the pilot with. I use a Turner hand torch. The swab stops up the fine holes in the bottom of this fire, and there is no way to get them cleaned without taking off the burner and punching out each hole with a wire. The Turner torch gives so fierce a heat that it burns the oil in the vaporizing tube if directed sharply upon it so that after two or three months the tube gets stopped up with carbonized oil and must be bored out with a twist drill to which a shank or extension is welded. The stoppage occurs just inside the sheet-iron case, or about four inches from the nozzle end of the tube, where the vapor issues. It can be bored out without removing the burner from the boiler.

With a Phelps pump on the main fire, we find no difficulty in making steam enough for twelve miles an hour day in and day out on our common country roads, which are hilly enough to try the mettle of any engineer. We run the pump at 150 pounds. With a lively fire care must be had not to feed too much oil, as the back pressure from the vaporizing of too much fuel will run the gauge up to 200 or 250, which is above the resisting power of the pump chambers, and we have twice burst off the head of one chamber. If the gauge needle pulsates rapidly there is too much oil.

J. S. Corbin.

Auto Show at the World's Fair.

By Harry B. Haines.

The St. Louis tourists who visited the Transportation Building at the World's Fair grounds and viewed the vehicles exhibited by the manufacturers there, were disappointed, as was everyone else who went to see the horseless vehicles. The American manufacturers have to a great extent ignored the exhibition, and many of the concerns recognized as leaders in the industry have no exhibits whatsoever.

There were many who expected to see all the new 1905 types, but these are conspicuous by their absence. The large and palatial limousine cars and touring cars turned out by some of the American manufacturers are nowhere to be seen, and in elegance of body finish and interior appointment, the foreign cars overshadow the American by far. There is absolutely no comparison.

The whole exhibit was 'way behind the times, and there is nothing shown that did not appear at the New York Auto Show last winter. The cheap cars of the runabout type predominate at the various booths, and the whole exhibit bears a sort of, "Well-I-suppose-we've-got-to-do-something" air. The American cars exhibited exceed the foreign in number, but the latter more than make up for this in elegance. To the uninitiated going in to see the machines, it is distinctly a foreign show, in point of excellence of exhibits.

Almost the first thing the visitor sees upon entering the hall is Tom Fetch's Old Pacific, mud-covered and travel-stained from its trip across the United States from San Francisco to New York, and then over the Endurance Contest route to Pittsburg, Pa. The wooden rim of the steering wheel is worn in places from Fetch's strong grip while piloting the car across country.

At the Haynes-Apperson booth the "first gasoline car ever operated successfully in America" is exhibited. It was built in 1894, just ten years ago, and its manufacturers are the oldest concern in the business in America. One glance at its crude engine, transmission and general lines, and another at the huge tonneau touring car with canopy top, the 1904 product of the same firm, tells better than words the wonderful progress that has been made. The contrast is so great that it is impressive, and it is an equally remarkable advance as that from the old time locomotives to the huge monsters of to-day. There is a sort of fascination about this old junk relic, this pioneer of other days, but crude and uncouth as it is, it represents the first gleam of light in the solution of the problem of horseless vehicle transportation, which bids fair to become one of the greatest factors in the world's commercial life when its development is complete. It sounded the first keynote of warning of the abolition of the horse.

Although the exhibits are not as numerous as they might be, they are of widely different types. There are auto ambulances, trucks, delivery wagons, coupés, broughams, touring cars, runabouts and, in fact, a duplicate in the horseless of almost all types of horse-drawn vehicles. There are about forty exhibits, in which are shown approximately eighty-one fully equipped machines, including seven delivery wagons, six heavy trucks, one buckboard, ten motor cycles and one railroad car. But six of the manufacturers exhibit a chassis, and few have any moving exhibits, all complaining that the cost of electric power is exorbitant and they are not allowed to bring gasoline into the building. No racers are exhibited, all the cars being in use on the various tracks.

That the manufacturers attach but little importance to the show, is proven by the fact that many of them have exhibited for the greater part their lighter and cheaper cars, evidently believing that this is the type of machine that will appeal most to the people who visit Worlds' Fairs. The Pope Manufacturing Co., for instance, are exhibiting the Pope-Hartford and Pope-Tribune, and have no place for the Pope-Toledo, their highest grade car. The Winton, White, Ford, Grout, Pierce, Packard, Knox, Electric Vehicle and Ranier Co.'s, the Olds Motor Works, Thomas B. Jeffrey & Co., Duryea Power Co., Haynes-Apperson Co., E. R. Thomas Motor Co., Matheson Motor Car Co., Peerless Motor Car Co., Baker Motor Vehicle Co., Smith & Mabley, Pope Manufacturing Co., and the National Motor Vehicle Co. are among the firms making exhibits.

The electric driven products are given fair prominence, and many types of vehicles of this class are shown. There is a surprising lack of vehicle parts, such as steering knuckles, cylinders, connecting rods, ignition apparatus, etc., such as is generally shown at an auto exhibit, to demonstrate the good material and workmanship in the cars. There is a fair exhibit of accessories, including the products of Gray & Davis, Twentieth Century Mfg. Co., Dayton Electrical Mfg. Co., Shelby Steel Tubing Co., Timken Roller Bearing Axle Co., Veeder Mfg. Co., Saks & Co., Motsinger Device Mfg. Co. and A. L. Dyke.

The tire manufacturers evidently overlooked the big fair, for they have made absolutely no showing. Some of them boom the hard rubber end of their business along, but the vehicle tires are missing from the show.

The French manufacturers monopolize the space in the foreign section, and show many palatial cars of high cost. The upholstery and body finish work is excellent, and the working out of the smallest details most wonderful. A De Dietrich Pullman Salon car, selling at $18,000, is an exhibit that attracts no little attention. The car is fitted with a 40 h. p. four cylinder motor. The body is a huge limousine, the inside of which is elegantly upholstered and fitted up. There are four individual seats, a small writing desk, cloth card case, and other such conveniences. There are also electric lights for illumination at night. All types of cars from the light two-passenger to the Rothschilds 'bus carrying twenty or more people are shown. The racers that have carried off the big French events of the past two years are also to be seen, all properly labeled. Many side entrance tonneaus are shown, and the American cars of 1905 will for the greater part copy the design, and use this popular and convenient type of body.

Altogether the auto exhibit at the fair is just a bit dull. Had the manufacturers displayed the proper interest, it could have been made the feature of the exhibition. As things are, it is an ordinary show, and receives the attention that it deserves and no more.

Long Branch Automobile Carnival.

The automobile carnival and show, which was held at Long Branch August 15-20, proved to be the centre of attraction for a large number of motorists from New York and New Jersey besides, of course, bringing out many of the summer residents of that locality.

The show, in the West End Casino, was formally opened Monday evening with fifteen exhibitors. On Monday afternoon races were held on Ocean Avenue. Five half-mile events were run off. Interest centered chiefly in the "free-for-all," in which E. R. Thomas's 60-horsepower Mercedes was matched against H. S. Harkness' car of like make and power. E. E. Hawley, driving for Mr. Thomas, won easily. In the first heat Mr. Harkness ran over and killed a dog which had strayed out into the road and a serious mix-up was barely avoided. As was to be expected, by far the greatest speed made during the afternoon was attained in this race.

The event for electrics brought out several lady operators. The cars used were decorated with streamers, and the ladies carried large bunches of roses. Mrs. C. C. Miller, of Long Branch, crossed the finish line slightly ahead of Mrs. A. L. McMurtry, of Baltimore.

SCENE AT THE ELKWOOD PARK TRACK.

At ten o'clock Monday morning Sidney B. Bowman started on his attempt to break the non-stop record of 2,017 miles made in England recently.

On Wednesday and Thursday afternoons races were held at the Elkwood Park mile-trotting track. In the first race on Wednesday, which was scheduled to be of 100 miles, for the purpose of establishing track records for from 50 to 100 miles, the starters were H. S. Harkness with his Mercedes; Hawley, driving E. R. Thomas's car; and Joseph Tracey, driving a Royal Tourist. Hawley stopped at the end of the first mile, claiming he had been fouled by Harkness, but as the judges paid no heed to his protest he continued for a time, finally quitting at the thirteenth mile. Tracey retired in the thirty-sixth lap. Harkness had taken the lead at the start and held it throughout, being finally stopped by the judges when he had completed fifty miles, there being no further competition. He succeeded in establishing new records for from 21 to 60 miles. Alexander Winton had previously held the record for 50 miles and there had

HAWLEY LEADING HARKNESS IN THE OCEAN AVENUE RACES.

been none for from 51 to 60 miles. Harkness's time for the entire distance was 1h. 12m. 40 3-5s. His fastest mile was the fifty-fifth, which was made in 1.05.

Hawley and Harkness came together again in the race for cars costing from $5,000 to $15,000, and in the one-mile free-for-all, each winning one of these events.

The five-mile "pick up" race afforded variety and furnished considerable excitement. The competitors were obliged to stop at the end of each lap and take on one passenger, making four who rode in each car, besides the operator, during the last lap. The event was won by Charles R. Greuter, driving a Matheson car, in 6.48 2-5.

In the ten-mile challenge race on Thursday, the rivals, Hawley and Harkness, met again, the Thomas car once more carrying off the honors. The gymkana race was the novelty of this day. The operators were obliged to drive around and between obstacles, and their relative standing was computed on a basis of points scored rather than on time consumed in completing the distance to be covered. H. R. Lounsberry, driving a Meteor, won the event, with eleven points to his credit.

Mrs. C. C. Miller and Mrs. A. L. McMurtry again drove their electric cars in competition in the one-mile match race for electrics. The result was the same as on the occasion of their previous meeting on Monday: Mrs. Miller won, in 3.06 3-5.

Friday the scene shifted to Spring Lake. In the morning a prize parade was held, in which some thirty cars took part, a large percentage of which were decorated. L. E. Wells (Winton) won first prize; Col. Schoonmaker (Packard) second, in the class for touring cars; and Miss Riker first and Mrs Zacharias second, in the class for runabouts.

In the afternoon dash races were held on the Ocean Drive over a distance of about half a mile. B. M. Shanley, 90 h. p. Mercedes, and E. E. Hawley, 60 h. p. Mercedes, started in what was expected to be the most exciting event of the afternoon, but before covering more than a hundred yards Shanley stopped. Hawley finished in 42 secs.

Rain in the morning deterred from starting nearly half of those who had entered for the Floral Parade, the closing event of the week. Between twenty-five and thirty were on hand, however, and with Winthrop E. Scarritt in the lead, the procession moved through the gaily decorated streets. Prizes were awarded by Mr. Scarritt as follows:

Best decorated car, Mrs. C. C. Miller, Long Branch (Studebaker); most grotesque car, Mr. C. C. Miller, Long Branch (Mercedes); most original car, Mr. F. A. Hearn, New York (Buffalo); best decorated car driven by woman, Mrs. R. A. Newton, New York (Autocar); best decorated car carrying four passengers, Mr. H. A. Smith, New York (S. & M. Simplex); decorated car carrying largest number of women, Mr. G. A. Smith, New York (Packard), carrying eight women.

Sidney B. Bowman ended his non-stop run Saturday at the end of the 2,502d mile. His engine stopped once during the week, when it became necessary to use heroic measures to prevent running over a child.

The summaries for the various events of the week follow:

MONDAY, AUGUST 15TH.

Half mile, free-for-all; best two in three heats. E. R. Thomas (Mercedes), first; H. S. Harkness (Mercedes), second. Time: 40 2-5 and 31 4-5 secs.

Half mile, best two in three heats; for electric machines only. Mrs. C. C. Miller (Waverly), first; Mrs. A. L. McMurtry (Waverly), second. Time: 2.03 1-3 and 1.57 secs.

Half mile, best two in three heats; for regular stock machines; $650 or under. H. L. Lewis (Oldsmobile), first; F. W. Stockbridge (Oldsmobile), second. Time: 1.23 and 1.13 secs.

Half mile, best two in three heats; for machines $2,000 to $3,500. Joseph Tracey (Royal), first; Frank Sibley (Berg), second.

Quarter mile, best two in three heats; for cars from $650 to $1,600. Dichard De Gray (Franklin), first; J. F. Johnson (Franklin), second. Time not given.

WEDNESDAY, AUGUST 17TH.

One Hundred Miles Record Race, to establish world's record on the track—Won by H. S. Harkness, 60 h. p. Mercedes, who was awarded the race at the end of sixty miles, other contestants having withdrawn. Time: twenty-five miles in 28.30 2-5; fifty miles, 61.23 1-5; sixty miles, 72.40 3-5.

One Mile, best two in three heats, for machines from $650 to $1,000—Won by R. Newton (Autocar); L. W. Lord (Pope Hartford), second. Time: 1.50 3-5.

Three Miles, machines costing $5,000 to $15,000; if driven by owners, 10 seconds' handicap allowed in each mile—Won by H. S. Harkness (Mercedes); E. R. Thomas (Mercedes), driven by Edward H. Hawley, second. Time: 3.28 1-5.

One-Mile Free for All, best two in three heats—Won by E. R. Thomas (Mercedes); H. S. Harkness (Mercedes), second. Time: 1.06 4-5 and 1.05 4-5.

Five-Mile Pick-up Race—Won by Charles R. Greuter (Matheson); A. Murray (Panhard), second. Time: 6.48 2-5.

THURSDAY, AUGUST 18TH.

Ten-Mile Challenge Race (open to all)—Won by E. R. Thomas (Mercedes). Time: 10m. 40s.

One-Mile (open to machines costing $2,500 to $5,000—Won by Joseph Tracey (Royal); Charles R. Greyter (Matheson), second;. Time: 1m. 19s.

Five-Mile Handicap (open to all—Won by Richard Newton (Autocar), with 4m. handicap; Joseph Tracey (Royal), 2m., second; E. R. Thomas (Mercedes), scratch, third. Winner's time: 8m. 9 1-5s.

One-Mile Race (for machines costing $650 or under)—Won by R. G. Howell (Oldsmobile); F. Tobias (Oldsmobile), second. Time: 2m. 20 2-5s.

Gymkana Race—Won by H. R. Lounsberry (Worthington); Frank Sibley (Berg), second. Winner scored 11 points.

One-Mile Match Race (for electric vehicles)—Won by Mrs C. C. Miller (Waverley); Mrs. A. L. McMurtry (Waverley), second. Time: 3m. 6 3-5s.

FRIDAY, AUGUST 19TH.

$650 to $1,000 Class—Charles Howard (Pope-Hartford), first; Harrington Sickles (Cadillac), second.

$1,000 to $2,500 Class—E. G. Davis (Franklin), first; C. E. H. Stengle (White), second.

$2,500 to $5,000 Class—Joseph Tracey (Royal), first; H. R. Lounsberry, Jr. (Meteor), second.

Free for All—E. E. Hawley (Mercedes), first.

Vanderbilt Cup Race.

On August 23 permission was granted by the Board of Supervisors of Nassau County, L. I., for the holding of the Vanderbilt Cup race on October 8th next, over the course which had been selected for the event by Messrs. Vanderbilt and Wallace and Chairman Pardington, of the racing board of the A. A. A.

The route selected is over what is known as the "short triangle," which takes in the Jericho, Hicksville, and Hempstead turnpikes with turnings at Queens, Jericho, Floral Park, and Hempstead. This course is about thirty miles long and provides local roads with good surfaces.

It was agreed that the policing of the course during the race should be done by men supplied by the county authorities, but that the expense of such policing should be borne by the A. A. A. The start will probably be near Jericho and the finish at Hempstead. Ten laps will be made, making the total run about 300 miles.

Cable advices to private individuals state that two Panhard and two Napier cars will be shipped to this country for the Vanderbilt Cup race. It is also rumored that Wolseley, Clement-Bayard and Mercedes cars will soon be entered. The American entries so far consist only of those mentioned a short time ago, although several other firms are expected to nominate cars.

Omaha Race Meet.

A race meet is to be held at Omaha, Neb., on August 23 and 24. It is expected that many of those who compete at St. Louis on the 21st will be present, among whom are Barney Oldfield and A. C. Webb. Eight events are scheduled for each day, and in the classification a distinction is made between stock and racing cars.

Glidden Cup Conditions.

The following conditions have been suggested for the contests for the cup offered to the A. A. A. by Chas. J. Glidden, of Boston, although it appears that nothing has been officially decided in the matter:

First—The cup shall be known as the Charles J. Glidden Touring Cup.

Second—The cup shall be competed for annually, beginning with the year 1905, by members of the American Automobile Association, or of any club in the world recognized by them. Each contestant shall have been a member at least one year.

Third—The distance driven shall not be less than 1,000 miles nor less than 500 miles weekly, and shall be over regularly used highways.

Fourth—The car shall be driven by the owner or a driver approved by the committee, the owner being a passenger in the car.

Fifth—The contest for the years 1905, 1906 and 1907 shall be held in either the United States or Canada, or both.

Sixth—The rules governing the contest shall be fixed by a committee of seven, consisting of the president of the American Automobile Association, who shall be chairman, the presidents of the Automobile Club of America, Great Britain and Ireland, France, Germany, an automobile club of Canada to be recognized by the American Automobile Association, and the donor or a representative selected by the above named persons. The chairman and two members of the committee or their nominees shall constitute a quorum.

It is understood that several entries have already been made for next year's contest, among them being Harlan W. Whipple, W. C. Temple, James L. Breese and R. S. Scott.

The Cleveland Races and a New Record.

Although originally scheduled for August 19 and 20, the third annual race meet of the Cleveland Automobile Club at Glenville track was, because of rain, postponed to Monday and Tuesday, August 22 and 23.

The feature of the first day proved to be the breaking three times within an hour of the world's mile track record by Earl Kiser driving the Winton "Bullet No. 2." He first appeared in the race for the Diamond Cup offered by the Diamond Rubber Co., of Akron, Ohio, and accomplished a mile in 54 seconds, which beat the recognized record for the distance by just one second. Later in the special race for eight-cylinder cars he twice made a mile in 52 4-5 seconds, which, of course, is now the world's record.

The Diamond Cup becomes the property of the manufacturer whose cars win it three times. It has so far been won twice by the Ford-Cooper "999," once by the Winton "Bullet No. 2," once by the Peerless "Green Dragon," once by a Darracq, and once by a Pope-Toledo. It was won at this meet in a most exciting race. After a failure to effect a satisfactory flying start, the contestants were lined up on the starting line and sent off in that way. Shortly after crossing the line Kiser's motor stopped and in cranking he lost five-eighths of a mile. He, however, jumped immediately into top speed and gradually overhauled and passed all the other competitors except Lyttle, driving the Pope-Toledo, behind whom he finished by only a short yard.

The summary of the first day's racing is as follows:

Runabouts, two miles—George Russell won; W. F. Winchester (Franklin), second; W. C. Baker (Baker), third. Time, 3m. 47s.

Manufacturers' Challenge Cup, five miles. —H. H. Lyttle (Pope-Toledo), won; Earl Kiser (Winton), second; Carl G. Fisher, (Premier), third. Time, 5m. 24s.

Five miles (handicap).—J. Soules (Pope-Toledo), handicap, ¾ mile, won; Carl G. Fisher (Premier), ¼ mile, second; Charles Gorndt, ⅜ mile, third. Time of winner, 4m. 53s. Time of scratch car, 5m. 44 1-5s.

Five miles (open for stock touring cars). —J. Soules (Pope-Toledo), first; A. E. Morrison (Peerless), second; R. H. Magoon, third. Time, 5m. 51 2-5s.

Special race (for eight-cylinder cars).—Earl Kiser (Winton), first; H. H. Lyttle (Pope-Toledo), second; Carl Fisher, third. Time, 4m. 51s. The last mile in 52 4-5s.

A Large Southern Garage.

The photo herewith shows a view of the garage operated by R. V. Connerat in Savannah, Ga., and incidentally an array of some of the cars stored and cared for in it. Mr. Connerat is the representative in the South for the George N. Pierce Co., of Buffalo, N. Y. It will be observed that by far the greater number of cars stored at his place are of the runabout class, which is the exact opposite of the conditions in most New York City garages.

The building is of brick, 30 x 90 ft., three stories high and with an imitation marble front. The first story is used as a show room, and has a granolithic floor. The second story contains the machine shop, and the third is used for storage purposes. There are no posts or columns in the storage room, and it is claimed that 100 cars can comfortably be cared for in the available space. The second and third stories are reached by elevator, the size of which is 8 x 15 ft. It has a crosshead 8 ft. 6 in. above the floor, and is operated by a 12 h. p. electric motor with direct belt drive to the hoisting drum. The machine shop is well equipped, and a force of experienced gas engine mechanics is employed, so that the most difficult repair work can be handled.

The building is located in the business section of the city, and just off Savannah's most popular street, which appears in the illustration. The U. S. Custom House, Post Office and County Court House are in the same square.

CONNERAT'S GARAGE, SAVANNAH, GA.

According to the *Giornale d'Italia* the Pope has decided to purchase an automobile for use in the shady groves of the Vatican gardens in place of the traditional light carriage drawn by funereal-looking horses.

TOURING ROUTES

Quebec, Canada to Rangeley and Portland, Maine.

The following information on routes between these points is furnished us by James B. Dill, of Orange, N. J., who has toured this section in a White touring car the last two summers:

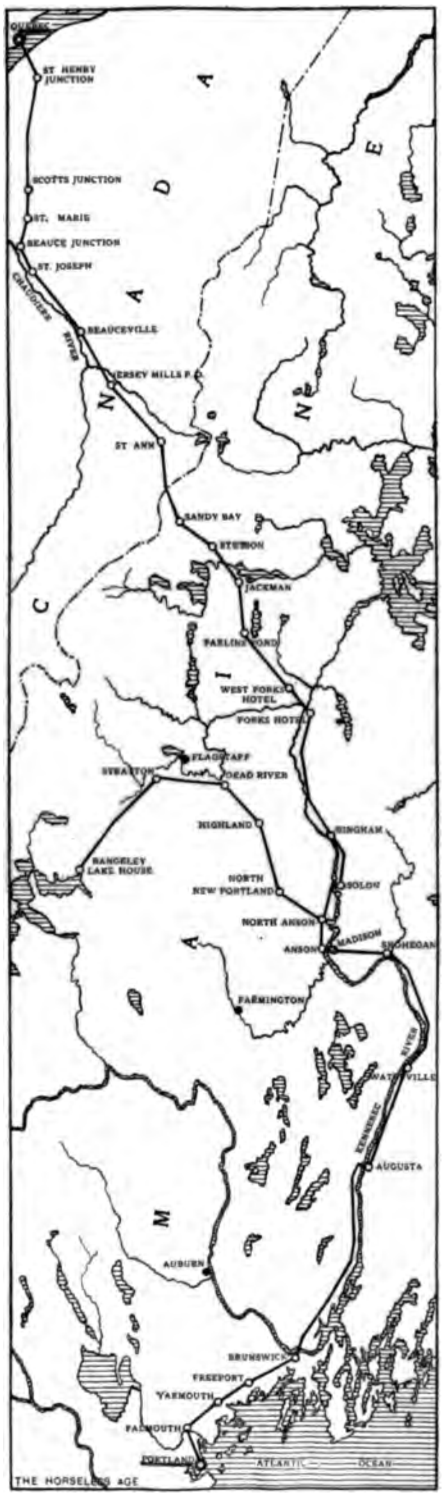
Quebec cross the ferry to St. Levis; take left-hand road up hill (grade not difficult); turn right with car tracks to St. George street, then left into St. Henri street. There is a toll gate about two miles from the ferry. A straight macadam road leads to St. Henri Junction (11¼ miles). There cross the railroad tracks, and continue over good macadam road to St. Henri (14¼ miles). Here turn right across the toll bridge and continue 2¼ miles to hamlet, where road turns to left; ¼ mile farther on, at a white barn, turn to the right and continue direct to Scott's Junction (28⅝ miles), over clay and gravel road in fair condition; from this point on game (deer and partridge) is abundant, but no automobile supplies are to be found until Jackman, Me., is reached.

Follow the Chaudier River and valley over a straight natural gravel road in good condition to Ste. Marie (34⅛ miles), and continue down stream (no other road) to Beauce Junction (41⅜ miles) over a good dirt road. Run straight on to St. Joseph (46⅝ miles), Beauceville (57¼ miles) and Beauceville Hotel, formerly St. Francis (end of the railway), over good dirt road. Gasoline must be sent by freight from Quebec to Beauceville Hotel, no gasoline being found from here to Jackman, Me.

Run straight down valley on left bank of river through St. George to Jersey Mills P. O. (69½ miles) over good road with short hills. At McGrath's Hotel, Jersey Mills P. O., turn to the left up the hill, leaving the Chaudier Valley, and following the Riviere de Loup over the hills to Ste. Anne (86⅝ miles), over good, but hilly roads. Keep straight on to Boundary Line (97⅛ mile), where there is a little hotel, the Line House. Roads are hilly, but good. Continue down the steep hill and ascend again over hill to Sandy Bay (101 miles) over good rolling road; passing around Bald Mountain, a straight road (good and rolling) leads to Stetson (108⅝ miles). Descend by easy grades over a fine road to Jackman (112½ miles), a Canadian Pacific station. At the Newton House in this town gasoline can be purchased.

From Jackman go by Kennebec stage route, a good dirt road with easy grades, to Parlins Pond (125¾ miles), and straight on over easy down grades to West Forks Hotel (135 miles). Descending, cross the eastern bank of Kennebec River to Forks Hotel (140⅛ miles), and continue down the river road (good and level) to Bingham (163⅝ miles). At the hotel at Bingham gasoline may be purchased. Continue to Solon (172⅛ miles).

Leave the Kenebec by crossing the river,



either by ferry at Solon, or by continuing down for three miles, then turning to the left at cemetery, and four miles farther on crossing bridge to North Solon, these seven miles being level gravel road. To go direct to Portland, do not cross river, but continue to Skohegan, the route being described further on.

At North Solon turn to the right to North Anson (182⅜ miles), over good natural gravel road, level and rolling. Turn to the right to North New Portland (190⅛ miles) over the same kind of road. The last two towns both have a hotel, and gasoline may be purchased there. Take the Dead River road ascending by easy grades and fair gravel road to "Height of Land," thence by excellent road passing Flagstaff on the right to Stratton (219 2-3 miles). At Stratton there is a hotel. Cross the river, and at Watertown take the left-hand road (fine, level, gravel) up hill to Dead River station (242¼ miles), and continue to Rangeley Lake House (246⅛ miles), where all supplies are obtainable.

Between Quebec, Canada and Jackman, Me., and between Jackman and the Forks no supplies are obtainable. From the Forks to North Anson gasoline is to be had in practically all the towns. From North Anson to Rangeley no gasoline is obtainable, unless ordered in advance at Flagstaff, Eustis or Stratton. The hotels at either place will obtain it on a day's notice. Too much cannot be said of the scenic beauty of this route, while the roads, especially through the Dead River region (70 miles), are firm, hard, level and smooth.

To go from Rangeley to Portland, retrace route through Dead River region to North Anson (64 miles), take straight rolling dirt road to Anson (69 miles); cross river to Madison (69½ miles, level road), and leave river, taking the direct road (rolling, dirt, some sand) to Skohegan (79½ miles); follow river over level and good dirt road to Waterville (97 miles), and Augusta (115 miles). Cross river and follow level or rolling good dirt road through Hollowell, Gardiner, Richmond, Boudoinham to Brunswick (148 miles). From Brunswick the road (level but somewhat sandy near Brunswick, and only fair) runs direct to Freeport (157 miles), and continues straight (clay, poor but level) to Yarmouth (163 miles) and Falmouth, 168, the latter section being also of clay and fair. From Falmouth, ascending easy grades the road runs to Portland (174½ miles).

A route shorter in miles but with heavier grades is from Rangeley to Phillips, Farmington, Lewiston and Portland. Familiarity with both of these routes leads one to prefer the route of the Kennebec Valley and through the Dead River region.

All our European contemporaries have reprinted the evidently cabled news of a recent alleged automobile hold-up in which the owner was said to have been relieved of $1,000 by the bold robber, who then forced him to cut his tires and empty his gasoline tank. The whole story later proved to be a fake, and the papers who printed it have been imposed upon.

MINOR MENTION

The East Orange, N. J., assessors are contemplating the taxing of automobiles.

La Crosse, Wis., is soon to have an automobile club, the main object of which will be to further the cause of good roads.

It is reported that the Sandusky Automobile Co. is still continuing business despite recently instituted bankruptcy proceedings.

The Chicago City Council has recently passed an ordinance regulating the amount of noise an automobile horn may make.

Bennings, the famous running horse race track in Washington, D. C., is to be the scene of an automobile race meet on Labor Day next.

The Dallas, Tex., Automobile Club has decided to hold a race meet in November. Barney Oldfield will be the customary attraction.

The Pittsburg Transfer Co., of Pittsburg, Pa., recently placed an order for four double cylinder Knox wagons for transferring passengers and baggage.

Frank L. Steen was killed outright and Seth Burnett was seriously injured on Aug. 15 in a grade-crossing-automobile accident at Indianapolis.

A new electric car is soon to be placed on the market by a Columbus, Ohio, firm. It will be largely assembled from parts now on the market.

Despite the efforts of the motorists in general and the Chicago A. C., in particular, the ordinance was passed on July 11 and signed by the Mayor a little later.

It is reported that J. R. Sage, of the Iowa weather and crop service, is to use an automobile in making a flying trip through the State to note the crop conditions.

The Winton Motor Carriage Co. write us that Gov. La Follette, of Wisconsin, has purchased one of their cars for use in the present campaign.

The feature of the recent race meet of the Minneapolis Automobile Club held at Hamlin track, was the fast mile of Webb, on a Pope-Toledo. His time was 59⅖ secs.

Owing to mistake made in preparing Mr. Blake's article on "Case Hardening" (in our last issue) for the press, the term cast iron was used in the second line, where wrought iron was intended.

Frank L. Wean, Referee in Bankruptcy in the case of the Chicago Motor Vehicle Co., has submitted his report to the court. The liabilities, he found, aggregate $212,000, while the assets do not exceed $150,000.

About 350 automobilists of Boston contributed their cars so that the Grand Army veterans while on their recent visit to that city might enjoy an automobile ride through Concord and Lexington.

There is a movement on foot to construct an automobile highway between Kenosha and Racine, Wis. The present road between these points is reported to be extremely sandy.

The automobilists of Philadelphia are unable to take out licenses at the present time because of the non-arrival of a lot of tags which have been ordered by the city for some considerable time.

The City of New York has bought a large car for the officials of Brooklyn. Public Works Commissioner Brackenridge and Borough President Littleton will use the car for "city business only."

Charles W. Morris, of New York, who acted as a judge at the recent Mt. Washington hill climbing contest, died on Aug. 14 of pneumonia, which was brought on by exposure while officiating at this contest.

A motor car containing four passengers was recently driven over the edge of an open draw bridge in Chicago. The occupants were seriously injured, but there is hope that they all will recover.

At the coming race meet in Detroit the programme will set forth the times at which the various events will be called, and the clerk of the course will see that cars report at the starting line at the prescribed time.

The officials of the Brooklyn Ferry Co. recently issued an order that automobiles should not be pushed onto or off any of the ferries of the company. Motorists using these ferries are now obliged to have their cars hauled on and off by horses.

The authorities of Trenton, N. J., propose to erect signs about the city calling attention to the fact that the legal rate of speed for automobiles within the city limits is eight miles per hour, and that a fine of $25 may be imposed for each violation of the law.

The Chicago Automobile Club was last week granted an injunction by Judge Hanecy against the City, restraining it from enforcing the new automobile ordinance, which the club claims is unconstitutional. The city will fight the injunction.

The Packard "Gray Wolf," driven by Chas. Schmidt, broke the world's track record for 25 miles for the light car class at the Buffalo meet on Aug. 15. There was a variation of but 2 3-5 secs. in the fastest and slowest of the miles made.

A rawhide whip is the latest means employed to bring automobilists to a stop. A woman in a farm wagon recently threatened a party of Coshocton, Ohio., motorists with an application of the weapon if they attempted to pass her horses.

The Diamond Rubber Co., of Akron, Ohio; the R. E. Hardy Co., of Detroit, Mich., and the Sandusky Plumbing and Boiler Co. have jointly petitioned that the Sandusky Automobile Co., of Sandusky, Ohio, be declared insolvent.

Samuel F. Fry, of St. Paul, has begun suit against Mrs. E. C. Holden, of that city, to collect $270 damages, claiming that the defendant refused to buy a $1,350 automobile from him after having placed the order. He received the car from the manufacturers on July 22, and she refused to accept it.

An alderman of Joliet, Ill., advocates the licensing of all vehicles which use the highway. He points out that practically all of the necessary cleaning and repairing of the roads is occasioned by the use of horses and for this reason the licensing of automobiles only would seem unfair.

Thomas C. Berry, of San Francisco, was recently arrested and fined $25 for driving a motor car in San Rafael after sundown. He has appealed to the Superior Court and proposes to fight the case to a finish. The constable who made the arrest fired several shots before the car stopped.

We recently reprinted an article from a French contemporary in which it was recommended to wash a radiator out with a weak solution of sulphuric acid to remove incrustation. The author of the article now corrects himself to the effect that he meant hydrochloric instead of sulphuric acid.

The Automobile Club of Philadelphia in a circular letter to its members, calls attention to numerous complaints received regarding the fast and reckless driving of automobiles along country roads. The circular calls upon the members to comply with the rules of the road.

The American Napier Co. will establish general offices and show rooms about September 1 at 743 Boylston street, Boston. It is the intention of this company to import the Napier engines and transmissions, and erect the cars in Boston for the American market.

Fifteen thousand dollars damages is asked by Henry Grauman, of Egg Harbor, N. J., in his suit against Dr. Arthur Campbell, of Philadelphia. The car of the defendant, running at night without lights, it is claimed, ran into a carriage in which were Grauman and his family, wrecking the carriage and severely injuring the occupants.

The Chautauqua County Automobile Club was organized in Dunkirk, N. Y., on Aug. 11. Officers were elected as follows: A. W. Dods, president; C. E. Hequembourg, vice-president; J. W. Ware, secretary and treasurer; D. C. Fields and C. M. Rathbun, members of the Board of Governors, of which board all of the officers are members.

A new rule of the automobile department of the Secretary of State of New Jersey requires that the fee of $1 accompany the letter in which application for license is made. Heretofore a number has been granted to applicants who stated that they would take out a license later. This "cash in advance" method seems to be necessary.

Miss Margaret Dougherty, of New York, was serious injured recently through her hair catching in the valve gears or starting mechanism of a gasoline car. She had just left the car and was climbing a

flight of stairs when she fell and her hair became caught in the moving mechanism, and a portion of her scalp was torn off.

City Electrician Ellicott, of Chicago, tested out his "anti-scorching" device recently. By means of his invention a whistle is sounded continuously if the legal limit is exceeded by the car to which it is attached. It developed during the test, however, that the chauffeur had merely to detach the chain through which it was operated to make the device of no value as a "self-convicter."

President Dunham, of the Travelers' Accident Insurance Co., has issued a circular letter to the various agents of the company in regard to the increasing number of automobile accidents. He says that as the automobile is one of the "customary diversions of outdoor life," no extra rate to cover the hazard is expedient, but cautions the agents to use discretion in writing new policies in cases where the insured uses a motor car.

On Aug. 13 last, there were 774 automobiles and 117 motor cycles registered with the Secretary of State of Rhode Island and 25 dealers' licenses taken out. Figuring roughly, this shows one car to each 580 of the inhabitants of the State, which is practically the same proportion as exists in New York State. In New Jersey there have been 7,000 licenses taken out, but, nearly one-half of these are held by nonresidents.

W. B. Littleton, of Hagerstown, Md., had a toll gate experience lately. When the keeper on the Hagerstown and Boonboro Pike had refused to permit him to pass through the gate in his car on the payment of six cents, the charge for a single horse and buggy, Mr. Littleton broke the lock on the gate and drove through. The keeper insisted that the charge should be twelve cents. He says that he intends to make a test case of the matter if the turnpike company carries it to court.

On Thursday afternoon, Aug. 4, at 5 P. M., while A. T. Cross and wife, of Providence R. I., were returning from Pawtucket in their automobile, when near the corner of Eddy and Broad streets, the left hand steering knuckle broke, and the right hand one followed almost immediately after, throwing Mrs. Cross over the dasher, spraining her quite badly. Mr. Cross remained in the car. Fortunately the car was being driven slowly at the time the accident occurred, otherwise it would have been more serious.

Ransom E. Olds, of Oldsmobile fame, has organized a new company for the manufacture of automobiles. It is to be known as the R. E. Olds Co., and is capitalized at $1,000,000. Mr. Olds is president; Reuben Shettler, vice-president; and Edward F. Seer, secretary and treasurer. A factory is to be erected in Lansing, Mich., capable of accommodating 900 to 1,000 hands, and the new cars, which are of Mr. Olds' latest design, will be ready for the market early in 1905.

LEGISLATIVE AND LEGAL.

Automobilist Proceeds Against Stone Thrower.

While Robert L. Johnstone, of Glen Ridge, N. J., was driving leisurely through Mountain avenue, Montclair, on Sunday evening, August 14, showing some visiting relatives the beauties of that suburban town, a stone was thrown at the occupants of the car by a 12-year-old boy, Coke Flanagan, son of Dallas Flanagan, of Montclair, which hit a little girl in the tonneau close above the eye, causing an ugly wound and rendering her unconscious. The Flanagan boy was standing near a pony cart near the curb, and one other boy was in the cart. When the car passed the cart, the little girl was leaning over the tonneau door and made a remark that the pony cart at the curb looked almost exactly like her own. Almost immediately she was struck by a stone, and fell in the tonneau unconscious and with blood streaming from her face. Mr. Johnstone at once stopped the car, jumped out and ran after the boys. The one in the cart protested his innocence, stating that the stone had been thrown by his companion, Coke Flanagan, who had meanwhile run away. Mr. Johnstone, after taking the girl where her wound could be dressed, swore out a warrant for the arrest of the boy before Recorder Yost, of Montclair. When the case came up for hearing on Tuesday morning, at the request of the boy's father it was postponed until September. The physician who attended the little girl states that had the stone struck the least bit lower she might have lost an eye, and Mr. Johnstone is determined to carry the case through the court.

In Regard to the Chicago Ordinance.

On June 27th last, the so-called Werno ordinance was placed before the Chicago city council and immediately became the cause of a hot fight between the City Fathers and the automobilists. Its provisions are strict, stricter than those of any ordinance of a like character which had been adopted by any municipality or State in the Union. It requires that the operator pass an examination, both mental and physical. He must not be addicted to the use of alcoholic liquors or drugs, nor of a reckless disposition or subject to fainting fits.

He must have a complete knowledge of the car he is to drive. He must equip his car with a gong not over four inches in diameter, and must ring this gong at all corners and crossings. He must have two brakes on his car, either of which is capable of stopping the car in ten feet when it is traveling at the rate of ten miles an hour.

On Aug. 11 Judge Hanecy granted a temporary injunction to the 400 members of the Chicago Automobile Club, each individually mentioned in the petition, restraining the "City of Chicago and its Board of Automobile Registry, and all agents, employes, attorneys, and policemen from arresting, prosecuting, suing, or in any manner interfering with, annoying, or molesting the complainants for failing to comply with those parts of the ordinance which have to do with registering, numbering and the examination of operators.

The city has prepared an appeal which it brings on the ground that the Court had no right to enter the injunction without giving notice to the city of the fact that such injunction had been applied for.

Commercial Vehicle Notes.

A motor goods transport line between Havre and Candebec-en-Ceaux, France, is being contemplated by the Compagnie des Messageries Automobile du Havre a Etretat.

A public service of automobiles between Lindenfels and Bensheim, in Southern Germany, is being planned.

The Alting, of Iceland, has made an appropriation for the acquisition of a motor omnibus for experimental purposes. Nowhere would an air-cooled system be more appropriate, and we hope that some American manufacturer may secure the contract of furnishing the machine.

There are at present thirty-nine motor wagons in use by Borough Councils and other authorities in the United Kingdom, as follows: Metropolitan Borough Council, of Chelsea, 5; Hampstead, 2; Kensington, 1; Westminster, 3; County Boroughs of Blackburn, 2; Bootle, 2; Bournemouth, 3; Burnley, 1; Cardiff, 2; Forkestone, 1; Gates Head, 1; Leeds (street railway), 1; Liverpool, 6; New Castle, 1; Norwich, 1; St Helens (street railways), 1; Reading, 1; other authorities in London, 2; Acton, 1; Glasgow, 1; Smethwick, 1. These wagons are of the following makes: Thorneycroft, 16; L. S. M. Company, 12; Milnes Daimler, 2; Savich, 1; Coulthard, 2; Manns, 3; Straker, 1; Yorkshire, 1; Fodens, 1.

A five-ton gasoline truck made by the Whiting Foundry Equipment Co., and of the type described in this number, is in daily operation at the works of the Illinois Steel Co., of South Chicago.

The automobiles which were used last winter to convey the scholars in the primary classes of Adelphi College, Brooklyn, to and from school, proved so much more satisfactory than the trolley car system that the management will have eleven of them in operation when the coming fall term opens.

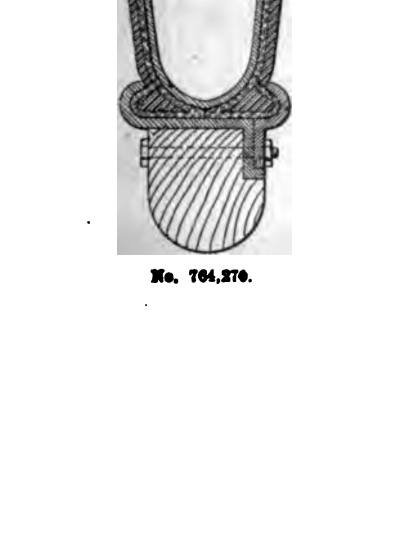
The Chicago, Burlington & Quincy Railroad is building at the Burlington's Aurora shops a large gasoline propelled motor car, which will soon carry passengers over the company's rails between Chicago and Aurora.

MOTOR VEHICLE PATENTS.

United States Patents.

764,727. Radiator for Cooling Fluids.—Thomas B. Jeffery, Kenosha, Wis., July 12, 1904. Filed March 2, 1903.

This invention relates to a cellular radiator for automobiles, composed of metal tubes. The ends of the tubes are enlarged and directly united to the ends of the surrounding tubes by soldering or brazing. The diameters of the tubes throughout the portions thereof between the enlarged ends are less than the diameters of the enlarged ends, thereby forming a space between the adjacent tubes for the circulation of the fluid to be cooled. The enlarged ends of the tubes are preferably in shape so as to form a close joint between the exterior surfaces of the flat faces of the adjacent tubes. The ends of the tubes are preferably expanded into hexagonal shape, and when such expansion is sufficient to make the ends of the tubes of somewhat greater diameter than that of the original tubes a space will be formed between the adjacent tubes, when they are assembled with their hexagonal ends in close contact. The extent to which the ends of the tubes may be expanded depends upon the ability of the material to stand expansion without fracture. In practice, however, it has been found that the best results may be obtained by expanding the ends of the tubes only to an extent that the distance between the opposite flat faces remains the same as the diameter of the original tube, and it is necessary in order that circulation around the tubes may be permitted, to contract the portions of the circulation-tubes throughout the portions between their ends along the lines of contact betwen adjacent tubes. Such contraction may conveniently be effected by forming corrugations in the tubes extending between the corresponding flat faces of the hexagonal ends.



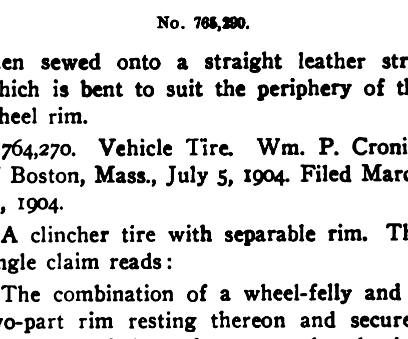
No. 764,270.

765,290. Tire Cover.—Martin Korth, of Cologne-Raderberg, Germany. July 19, 1904. Filed April 1, 1904.

This invention relates to a leather cover for wheels of automobiles. Great difficulties are met with in shaping leather, especially sole-leather, so that it may assume a synclastic curved surface and remain in this condition.

Under the present invention a leather cover is prepared from the best quality of sole-leather without dressing. Stampings of leather of rhombic shape are made, and these are fitted over a core of the shape of the completed tire. Two layers of the leather stampings are applied, in such a manner as to break joints.

The tire is secured to the rim in the following manner: The outer ends of the upper layer are bent outward, as shown, and those of the lower layer are bent in the opposite direction. Both edges are



No. 765,290.

then sewed onto a straight leather strip which is bent to suit the periphery of the wheel rim.

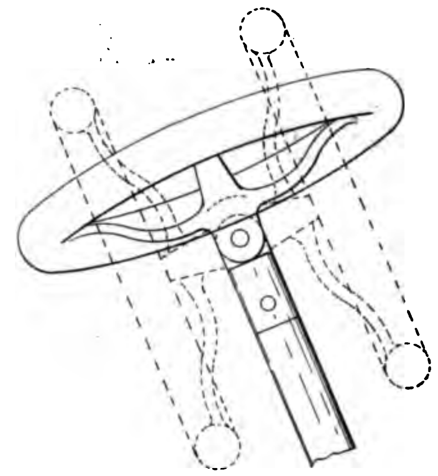
764,270. Vehicle Tire. Wm. P. Cronin, of Boston, Mass., July 5, 1904. Filed March 21, 1904.

A clincher tire with separable rim. The single claim reads:

The combination of a wheel-felly and a two-part rim resting thereon and secured thereto consisting of one member having a curled edge for engagement with the bead of the tire, and having an inwardly-extending flange which is arranged to engage upon one side of the felly, and a plurality of segmental plates having curled edges arranged to take over the other bead of the tire and having plate portions which are arranged to be clamped against said flange, all of said plates being adapted to form a ring.

764,967. Tilting Steering Wheel.—T. W. Warner and H. L. Warner, of Muncie, Ind. July 12. 1904. Filed December 31, 1903.

The hub of the steering wheel spider is pivoted to a supporting member, and is locked in its central or normal position by means of a spring pressed plunger. By withdrawing the plunger the wheel may be tilted either backward or forward. The support is an extension of the steering shaft, and is made separate from same simply for convenience in machinery.



No. 764,967.

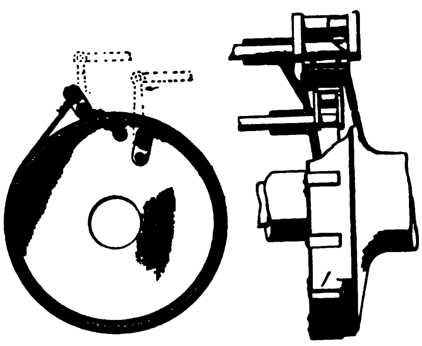
762,501. Pneumatic Tire.—Georges Steinberg, of Paris, France. June 14, 1904. Filed April 1, 1903.

Relates to a "self-healing" air tube, which requires no valve but can be pumped up by forcing the sharp point of a tire pump through its wall, which is withdrawn when the necessary pressure has been reached. In order to obviate the need for carrying about an entire air-cushion, the air-cushion is made in sections to fit round the wheel instead of making it in one piece.

In order that the punctures may become sealed automatically, so as to keep the chambers air-tight, the latter are made of five superposed layers of different kinds arranged, respectively, in the following manner, starting from the inside: The first layer is composed of pure Pará rubber, a sticky substance which by heating or steaming becomes pasty, not being vulcanized. The second layer is made of pure Pará rubber, to which is added a small quantity of sulphur in order to only half vulcanize it. The third layer is made of Pará rubber with enough sulphur to insure a complete vulcanization. The fourth layer consists of very strong cotton fabric, coated with a sulphur solution of india-rubber which will become entirely vulcanized during the heating or steaming. Finally, the fifth layer, forming the outer covering, is made of Pará rubber mixed with sufficient sulphur to produce complete vulcanization.

The first layer (inside) is about a fifth of the total thickness of the wall of the chamber, as is also the third layer. The second layer is a little thinner. The outer covering or envelop, on the contrary, is slightly thicker, and the fourth layer is only the thickness of the solutioned fabric.

765,498. Change-Speed Gear. Walter L. Marr, Detroit, Mich. July 19, 1904. Filed Aug. 3, 1903.



No. 764,325.

764,325. Double Brake for Vehicles. Alexander Winton, of Cleveland, O., July 5, 1904. Filed June 1, 1903.

The brake drum is integral with the wheel hub, and from the stationary tube surrounding the driving axle rises a bracket in which are formed bearings for two brake-lever shafts. Both brakes are of the band type, one contracting and the other expanding, with one fixed end and the other attached to the end of a lever arm. Both brakes act on the same drum. The shafts to which the operating levers are secured extend all the way across the vehicle to operate the brakes on opposite sides of the vehicle.

764,893. Means for Cooling Internal Combustion Engines for Automobile Use. —James H. Jones, of Bristol, and Fred H. Bogart, of Hartford, Conn. July 12, 1904. Filed January 18, 1904.

A multiple cylinder upright engine of the air cooled type is located on the frame in front, under a bonnet. The front wall of the bonnet is perforated, to admit a draft of air, and there is a circular opening in the top of the bonnet, directly over the cylinders, in which a fan ventilator is placed, which is fixed to an upright shaft, driven by bevel pinions from the engine crank shaft. While the engine is in motion the fan is also in motion, and will draw air from the source above the plane of the engine which would otherwise be unavailable. The fan will propel this draft of air in a direction to build up and also accelerate the natural draft, coming through the perforations in the front wall of the bonnet, so that the combined air-currents will keep the temperature of the engine-cylinders down to the desired point.

766,830. Motor-Vehicle. George Lane, Poughkeepsie, N. Y. Aug. 9, 1904. Filed Dec. 30, 1902.

766,926. Vehicle-Wheel. Carroll N. Beal, San Francisco, Cal. Aug. 9, 1904. Filed Jan. 28, 1904.

766,972. Vehicle-Frame. Thornton B. Rennell, Denver, Colo. Aug. 9, 1904. Filed Nov. 30, 1903.

767,043. Non-Collapsible Tire. John T. Dickey and Carry D. Derry, Barberton, O. Aug. 9, 1904. Filed June 9, 1903.

767,127. Controller for Automobiles. Alfred C. Stewart, Los Angeles, Cal. Aug. 9, 1904. Filed Oct. 8, 1903.

765,044. Vehicle-Wheel Rim. Frank A. Seiberling, Akron, Ohio. July 12, 1904. Filed Feb. 10, 1904.

764,998. Electric Igniter for Gas Engines. Edgar Ford, Wilmington, Del. July 12, 1904. Filed Oct. 15, 1903.

765,026. Pump-Regulator. William B. Mason, Boston, Mass. July 12, 1904. Filed June 15, 1903.

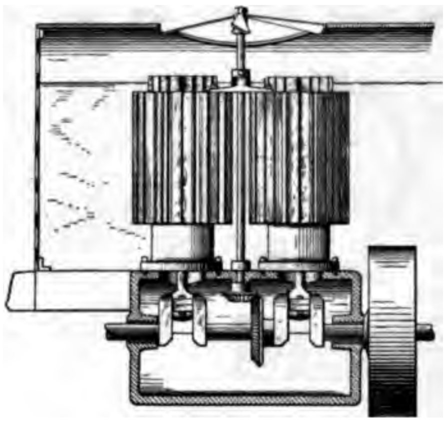
763,655. Steam Generator.—Thomas W. Barber, of London, England. June 28, 1904. Filed September 2, 1902.

763,654. Wheel Gearing for the Transmission of Power.—Samuel Baker, of London, England. June 28, 1904. Filed January 20, 1903.

764,519. Vehicle-Tire. Newton Crane, Boston, Mass. July 5, 1904. Filed Aug. 7, 1902.

764,737. Motor-Vehicle. Edward S. Lea, Rutherford, N. J. July 12, 1904. Filed Sept. 1, 1903.

764,960. Fitting for Preventing Side Slip in Motor-Vehicles. William Rourke, Bromley, England. July 12, 1904. Filed Nov. 20, 1903.



No. 764,893.

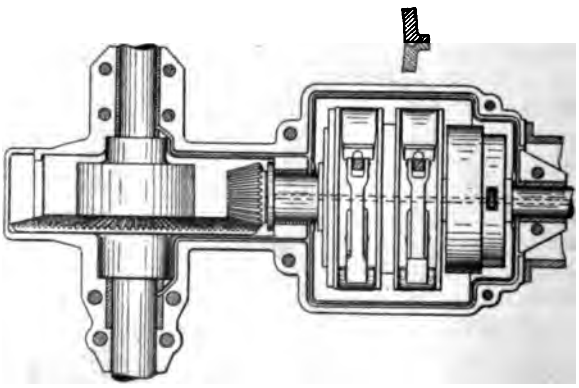
764,891. Wheel. Charles E. Hequembourg, Chautauqua, N. Y. July 12, 1904. Filed Dec. 17, 1903.

764,936. Pneumatic Tire. Harry G. Fitler, Philadelphia, Pa. July 12, 1904. Filed Nov. 28, 1903.

765,254. Motor-Vehicle. Walter W. Robinson, Chicago, Ill. July 19, 1904. Filed Dec. 7, 1900.

761,398. Motor Vehicle.—W. J. Phelps, of Stoneham, Mass. May 30, 1904. Filed April 9, 1903.

This patent covers the general arrangement of the mechanism as employed on the Phelps touring car. It claims the combination of a longitudinal casing composed of portions joined on a line inclined from the horizontal, power-transmitting shafting having a bearing in said casing, and an oil-duct for the lubrication of said bearing, whose walls are formed by the complemental meeting portions of the casing.



No. 761,398.

Club Notes.

DAVENPORT, IA., A. C.

Ten cars took part in the weekly club run of August 14. The destination was the Joslin fair grounds, about twenty-five miles out of the city. Upon their return to the city the participants went to Scheutzen Park and enjoyed a spread which awaited them.

NEWPORT A. C.

The club now has some fifty members. Among the latest additions to its lists are the names of: Colonel J. J. Astor, Messrs. Pembroke Jones, George A. Huhn, Marion Wright, Lispenard Stewart, Alfred G. Vanderbilt, Egerton L. Winthrop, Jr.; Benjamin Thaw, Jr.; Joseph Harriman, Lorillard Spencer, Lorillard Spencer, Jr.; W. G. Roelker, Walter S. Andrews, W. Watts Sherman, J. F. Pierson, Nathaniel Thayer and Dr. H. J. Knapp.

TOLEDO A. C.

The club has issued a pamphlet containing road maps of Lucas, Fulton, Henry, Wood, Sandusky and Ottawa counties, Ohio.

These maps seem to be somewhat incomplete in that they do not distinguish between the good and bad roads, and are not, therefore, so useful to motorists as they might be, but the pamphlet points out a line of club activity which should be more generally adopted, and for this fact, if not for the excellence of its maps, the club is to be congratulated.

A. C. A.

Secretary Butler is investigating the case of Simon Kameski, who was shot while riding in an automobile near Worcester, Mass. If Mr. Butler finds that the circumstances in connection with the case warrant it, the club will probably offer a reward of $1,000 for the apprehension and conviction of the man who did the shooting. The club has also applied, through attorneys, for a writ of habeas corpus summoning Justice Tyson, who has been acting in nearly all of the Long Island automobile cases, to appear before Judge Dickey and show cause why he should not be permanently restrained from further acting as a police justice.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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THE HORSELESS AGE

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The Auto Exhibit at the World's Fair.

According to the description of the automobile exhibits at the St. Louis Fair, in our last issue, a comparison of the French and American sections is not very flattering to the patriotic spirit of the native visitor who considers elegance of finish a criterion. The American manufacturers show mostly their cheapest models, while the foreigners have on view their most expensive creations, at least in some instances. The casual visitor to this section of the great show may see in this apparently poor showing cause for criticism of the American manufacturers, but we believe that the course pursued by them was entirely justified and, in fact, the only logical one. That the French makers pursued the opposite policy is due, no doubt, to the fact that they are less familiar with the conditions. They regard the United States as the land of millionaires who buy only machines de luxe, and hence thought it appropriate to exhibit cars of the most expensive type.

While undoubtedly wealthy people from the large cities visit the Fair, these do not go there specially to see or buy automobiles, as they can see the greatest variety and the latest models right in their home cities. The only class of visitors who may possibly become interested as buyers at the show are those from smaller towns, particularly from out West, who rarely see a machine at home, or know perhaps only of very few makes. Now, if the American manufacturers had exhibited their more expensive models, costing from $3,000 upward, most of this class might have been duly impressed by the glare and glitter of the finish and fittings, but would also have received the notion that automobiles are not for them. A car labeled "Please do not touch" would hardly appeal to Westerners as appropriate for their use, but a machine of plain finish, costing inside of a thousand dollars and looking equal to the strains imposed by rough roads is likely to appeal to many visitors as a likely business proposition, and may find purchasers among those who have no opportunities of buying cars from manufacturers or agents near their home. The business in automobiles done at the Fair will be largely in this type of machine, and a good deal of pioneer work or "ground breaking" will be accomplished by means of the exhibits of low priced cars.

A New Solution of the New York Show Question.

At both of the last two shows in Madison Square Garden, in New York City, a good deal of heart-burning was caused among exhibitors by the fact that, owing to the scantiness of the available floor space, some of them were forced into rooms adjoining the main hall, into the gallery, and even into the basement; and after the last show it became perfectly evident that some changes would have to be made in the arrangement for next year's show if all applicants for space were to be satisfied. The partsmen, through their new organiization, raised a protest against being relegated to the gallery, and the agents for foreign machines, it now develops, were also dissatisfied with their location in the "Restaurant." As the Madison Square Garden had already been leased for the purpose of the exhibition, and no larger building was available anyway, the only solution of the difficulty was a division of exhibits. A separate parts show was talked of at one time, but it was generally considered an unfortunate idea. Some of the "unlicensed" manufacturers considered themselves slighted in the allotment of space at the last show, and there was at one time a possibility of a separate show

for "unlicensed" cars for next year—which would also have been unsatisfactory in many respects. By far the best solution of the problem has finally been arrived at—that the agents for foreign cars have decided to hold a separate show simultaneously with the Madison Square Garden Show and in a nearby building. This arrangement ought to be satisfactory to all would-be exhibitors. There seems to be no more logical division of exhibits than into foreign and American products, as owing to the difference in prices the large majority of show visitors are interested in one or the other only. Those however ,who want to see the new machines of both American and foreign construction, can do so without trouble, owing to the proximity of the two exhibition buildings.

Foreign Body Builders Enter Field of Competition.

One of the interesting automobile news items of the past week was the announcement that two prominent Parisian automobile-body builders will establish plants in this country in the near future. The automobile-body industry of France has attained large proportions, it being the custom of French automobile manufacturers to sell only the chassis and let the customer have a body fitted to it at some body builders. Frenchmen are inclined to suit their own tastes when contracting for a body for their machines, and in consequence bodies are "built" in that country and not "manufactured." The demand for bodies for export to the United States seems to have not kept pace with the number of cars, as a number of automobile-body establishments doing work to individual orders have been established in this country, and in some cases have built up a reputation for high grade work. Many of the cars imported by agents arrive as chassis, and are fitted with bodies here, and most of the firms in the aluminum-body business are well supplied with work. One reason why purchasers of foreign cars often prefer to have the bodies fitted in this country is that they have a better opportunity to explain to the maker their personal wishes regarding shape, upholstering and finish. Of course, only a small proportion of cars produced in this country are fitted with special bodies to specifications of the purchasers, all the cheaper machines being equipped with *bodies of uniform pattern, produced on a* manufacturing basis, either by the automobile manufacturers themselves or by carriage builders, but the demand for luxurious carriage work seems to be on the increase, and it is not at all unlikely that a large industry may also be built up in this country for the construction of special bodies. It would certainly be an advantage all around if our millionaire automobilists should enter into a rivalry with respect to the most elegant, luxurious and comfortable body work of their cars instead of trying to outdo each other in the matter of power and speed of their machines.

Eliminate Cast Iron.

In nearly all the moderate-priced cars a great many parts are made of malleable castings which should be made from drop forgings or pressed steel. Cast-iron should have no place in an automobile, except where used on account of its heat-resisting or frictional qualities. The use of cast-iron makes a vehicle unduly heavy, thus reducing its hill-climbing power, increasing the fuel consumption, and aggravating the wear and deterioration of tires.

The reason malleable castings are used instead of steel forgings is that the castings occasion much less outlay for patterns than the forgings would for dies, and, besides, they are machined easier. There was a certain justification for the use of castings as long as designs were very unsettled and radical changes were found necessary every year, or even more frequently. But now that standard forms are being reached, and hundreds and even thousands of cars of the same model are sold, the great advantages offered by the use of steel may be secured at such low cost it seems to us exceedingly bad judgment to continue the use of castings. Of course, forgings will always be more expensive than castings, but when it is considered that perhaps as much as 90 per cent. in weight can be saved by the use of forgings, that the hill power of the car is increased and the fuel consumption decreased in nearly the same proportion, and that the wear and tear of tires is enormously reduced, it will be found that the little outlay necessary for forgings is an exceedingly profitable investment.

Forgings are, of course, also much more reliable and safe than castings; and in the case of wearing parts, such as gears and sprockets, the wear is much reduced, especially if the parts are case-hardened, and the risk of breakage may be practically eliminated. Among the parts which are now frequently made of malleable castings and which would be much better if made of steel, or, in some cases, of bronze, may be mentioned: rear axle fittings, frame fittings, spring horns, gear cases, gear pinions, sprockets and wheel hubs.

More Smash-Ups in Track Races.

During the week beginning Monday, August 22, four important track races took place, in Cleveland, Omaha, Detroit and St. Louis, respectively, and each was marked by some exciting performances not on the programme. At Cleveland, Carl Fischer broke a wheel and ran into the fence, fortunately without harm to himself or spectators; in Omaha, A. C. Webb's car skidded and went through the fence, wrecking a wheel, but causing no personal injuries, although the car narrowly missed two boys sitting on the fence; in Detroit, Wm. Newman drove into the fence to avoid a collision, receiving slight injuries, and in St. Louis Barney Oldfield, blinded at the turn by the dust cloud of a preceding car, drove through the fence, killing two men and receiving painful injuries himself. Evidence as to the dangers of track racing is thus rapidly accumulating. The chief factors of danger are the enormous strains on the running gear and the blinding dust clouds stirred up at the turns, owing to skidding. With the enormous increase in the power of racing monsters, and the consequent increase in speed, the ordinary unbanked earth tracks have become entirely unsuitable for automobile racing, and the construction of special banked tracks with tarred, dustless surface imposes itself if track racing is to be continued, and at the same time continual smash-ups and fatalities are to be avoided.

Autos in Detroit.

The automobile licensing ordinance in Detroit, which requires all resident owners and non-resident owners who stay in the city longer than two days to register their machines with the city license collector, went into effect on December 1, 1903. From tha tdtae to Thursday, August 25, 1,015 licenses were issued. During the month of May, 139 licenses were issued, or an average of 4.5 per day. During July the number was 75 or about 2.5 per day, and from August 1 to August 25 inclusive, 74, or about 3 a day. Most all of the licenses are issued to residents of the city, which has about 300,000 inhabitants with its suburbs.

Automobile Lubricants.

By Albert L. Clough.

The choice of lubricants of suitable quality for use upon the various wearing surfaces of an automobile is a matter of the utmost importance and has more bearing upon the length of life of the mechanism than any other consideration. Any employment of poor or unsuitable oil or any failure of the lubricant to actually reach the wearing surfaces results in a rapid destruction of the parts involved, while the constant use of liberal quantities of appropriate qualities of lubricant delivered exactly where the friction is produced results in the attainment of a remarkable degree of longevity by the moving parts which are so treated.

Important as is the subject of lubrication in all its details and definite as are the respective results which spring from good and bad practice in this regard, it is a curious fact that there is hardly any domain of mechanical knowledge the subject matter of which is more obscure, inexact and inapplicable to individual cases than that of lubricants and lubrication.

TESTS DIFFICULT.

Lubrication is not a particularly fascinating subject and very few people willingly give their attention to it. Furthermore, it is a very long, tedious and doubtful undertaking to determine the lubricating properties of an oil under any given circumstances, and the only manner in which it can be done successfully is by experimenting with the particular fluid in question under conditions of actual use or in an oil-testing machine in which actual conditions are as closely reproduced as possible for a protracted period of time.

Naturally, there is comparatively little oil testing undertaken, and that which is performed is usually carried out by oil manufacturers or by large industrial or transportation companies who are enormous users of lubricants. The information gathered by the former is in a measure turned to the advantage of the consumer, but that collected by the latter is generally kept secret.

There are such a large number of combinations of conditions under which the use of oil is required, involving differences in pressure, speed, temperature and other factors, that the lubrication of each new mechanism is in some respects a separate problem.

Furthermore, while the chemical and physical properties of an oil may be determined with considerable accuracy by means of laboratory tests, the art of lubrication doesn't seem to be sufficiently exact to enable it to be stated with confidence that an oil which combines certain chemical and physical characteristics will be the best lubricant under certain specified conditions. Experience in the use of a certain oil is the only source of really valuable information regarding it, and data of this kind the consumer is forced to accept upon hearsay, upon the say so of the manufacturer or some user, rather than at first hand.

Slight as is the value of the individual judgment of the ordinary small user of oils, there are certain facts the knowledge of which may be of help to him in his selection of lubricants.

ACTION OF LUBRICANT.

Lubricants are supposed to reduce the friction and the wear between two opposed moving surfaces by interposing between them a film of oil or grease, possessed of sufficient cohesion among its particles to resist the tendency to be squeezed out arising from the pressure between the opposing surfaces. Theory asserts that there are, between the two bearing surfaces, two films of lubricant, one of them adherent to each surface, and that the actual work of friction is performed between the two opposing liquid surfaces of these films. The thicker or more viscous the lubricant used the stronger its cohesion and the greater pressure will be necessary to force it out from between the bearing surfaces. At the same time the greater its viscosity the greater amount of work will be lost in friction at a given speed.

SELECTION OF OILS.

For use upon any particular bearing an oil of such thickness should be used as will just effectually resist the "squeezing out" tendency due to the maximum pressure which acts between the surfaces. This will render the loss in friction due to moving the oil upon itself less than would be the case if a more viscous lubricant were employed. When choosing an oil of appropriate viscosity or body, it is to be remembered that temperature exerts a most important effect on this property. An oil which at ordinary temperatures would prove amply viscous enough to resist squeezing out might, if heated materially, become so thin as to be quite unfit for its purpose and would, on the other hand, probably become so nearly solid upon a considerable reduction of the temperature as to lose its power of spreading and thus covering and protecting all parts of the bearings. One important requirement of a good oil is this, that its degree of viscosity should change as little as possible with temperature variations.

MUST BE NON-CORROSIVE.

In order that a lubricant shall not exercise a corrosive effect upon the bearing surfaces upon which it is used, it must not only be devoid of free acid or alkali, but must be innocent of materials, which, through the action of heat, oxygen or moisture, may develop corrosive materials. Free acid may occasionally be present in carelessly prepared oils, having been introduced during the process of manufacture, but its presence hardly need be apprehended in mineral oils of reputable manufacture. Animal and vegetable oils, under the influence of conditions met with in use, are ultimately decomposed into glycerine and fatty acids, which latter are exceedingly destructive to brass and bronze and somewhat less deleterious to iron and steel. Pure mineral oils are not decomposed in use and are hence greatly to be preferred. One statement may confidently be made: No animal or vegetable oil or grease, either pure or in combination with mineral lubricants, should be used upon any part of an automobile.

In the case of a gasoline automobile there are roughly four separate lubrication problems involved:

(1) Cylinder lubrication.

(2) Shaft bearings including those of the engine and change speed gear.

(3) Gear faces and chains.

(4) Wheel and axle bearings.

CYLINDER LUBRICATION.

The choice of an oil for use in the cylinders is the most important of all automobile lubrication questions. Probably the safest course for the individual owner to pursue is to use the oil recommended by the manufacturer of the particular car in question, until some oil known to be superior, is found. There is, however, hardly any danger in using any oil which has attained an extensive reputation, is generally carried in stock by dealers and which is manufactured by a reliable firm. Such an oil would hardly have reached a position of popularity if it were objectionable.

ROUGH TESTS.

It is decidedly injudicious to experiment with small samples of new cylinder oils, as the results are generally entirely inconclusive. Not enough oil is usually supplied to suffice for a test of adequate duration, and the ordinary user is not in possession of the apparatus necessary to conduct a really critical test. The rough observations which an ordinary user can make upon a new oil might include the apparent power delivered by the engine, the character of the exhaust, effect upon spark plugs, cooling water evaporated, and some similar crude data which could be of no great value.

Furthermore, he who is not supplied with scientific testing apparatus can never be sure that a supply of oil ordered by sample is honestly filled, especially if it comes from an obscure manufacturer. It is good policy, therefore, to "stick" to the oil that has given fair satisfaction, especially if of a well-known brand, as one is likely to be able to secure it of uniform quality at a great many widely separated points. When one is using a cylinder oil of fairly satisfactory character, it is well to bottle a sample and place it away for reference. It may be compared with a similar sample of each new lot of the same lubricant when received, in order to demonstrate the correct filling of the order. Such simple tests as taste, smell, color under different lights, and viscosity as judged by the behavior of the fluid when the bottle is inverted are not without their

value in determining whether one is receiving that which one has paid for.

REQUISITE QUALITIES.

Among the qualifications of a good cylin der oil are the following: First and foremost, it should be purely mineral in its origin and free from any admixture of animal or vegetable substances. It should possess sufficient body to serve its purpose when at a temperature considerably in excess of 212° F.—say at 350° F. It should not have lost too much of its viscosity at this temperature, nor should it waste away perceptibly through evaporation if maintained at this heat for a number of hours.

As to the flash temperature or "flash point"—the temperature at which inflammable vapors begin to be given off—authorities differ regarding its importance as a specification in fixing the qualities of a cylinder oil. It is admitted that it is impossible to produce an oil which will not be burned if it is actually brought to a temperature anywhere near that of the explosion. It is hardly possible also to produce an oil which will not be flashed if it reaches the temperature of the center of the piston head or that of any other portion of the mechanism which is unprovided with a water jacket. If an oil is used which will withstand without decomposition the temperature of the water-jacketed portions of the cylinder and remain unaltered upon the surface forming the piston travel, it is about all that can reasonably be expected. The temperature of the outside of the cylinder walls in normal operation never exceeds 212° F., and it is probable that in cases where the cylinder walls are thin and the water circulation good, the temperature of the inside wall is less elevated than one might infer. At any rate, it has been found that an oil possessing a flash point in the neighborhood of 450° F.—certainly not in excess of 500° F.—appears to serve very well. There is apparently no object in going any higher, and some valuable qualities are likely to be sacrificed in making the attempt.

The oil which is fed to the cylinder is finally evaporated, if not decomposed, but not until it has served its object. Some of it may be ejected with the exhaust still in the condition of oil, but most of it is apparently decomposed or "split" into a mixture of other hydrocarbons. It is very desirable that the oil may be ejected before its decomposition has so far advanced as to result in the freeing of carbon in the form of a lampblack, and it is possible chemically to favor the attainment of this condition. A cylinder oil should possess a satisfactory "cold test"—that is, it must withstand a large reduction of temperature without becoming too viscous to feed properly or too thick to be longer amenable to the spreading tendency due to capillary action.

The elimination from the oil of hydrocarbon compounds of a waxy or paraffin-like character much lowers the point at which the oil "freezes," but it is a decidedly difficult matter to combine in a single oil the somewhat antagonistic qualities of a good degree of viscosity at very high temperature and a satisfactory degree of fluidity when very cold. This difficulty is very well met by the employment of two grades of oil, a thicker one for summer and a thinner one for winter use.

"FLASH" AND "COLD" TESTS.

If one happens to possess a high-range thermometer, it is a very easy matter to gradually heat a sample of cylinder oil in a small dish over a gas burner. At no time in the process should there be noted any odor indicative of tallow or other organic matter being a constituent of the oil, and the lubricant should not become too thin or watery at any temperature below 450° F. The flash point may be roughly determined by reading the thermometer just as an inflammable vapor begins to be given off as shown by presenting a flame near the surface of the liquid.

By the use of ice water or of a freezing mixture composed of ice and salt, a sample of our oil may be cooled until it just ceases to be fluid when a reading of the temperature will give a rough idea of its cold test.

PROPER COLOR.

Cylinder oil for gas engine use should be perfectly clear, although it may be very dense optically. Its color, by transmitted light, should be amber, orange or brownish red and by transmitted light it should appear fluorescently green or blue. In direct sunlight or under the arc lamp this fluorescence should be particularly marked. Oil which does not show it is either not of mineral origin or has been tampered with by a chemical process.

BEARING OILS.

The lubricant best adapted for the oiling of shaft bearings may next be considered. Without much question, the bearings of a gasoline engine and of the change speed gear would come under the class of rather heavily-loaded bearings running at comparatively low speeds rather than under the head of high-speeded, light-loaded machinery. An oil of considerable body is thus indicated, and as all parts of engine and speed gear are quite hot while in service, the oil must possess sufficient body to do its work at the temperature of practice. If a reasonably fluid quality of oil has been selected for use in the cylinders, it will be found to answer admirably for the bearings. In case a magazine lubricator is employed, having pipes leading to the main bearings as well as to the cylinders, it may be filled with a single quality of lubricant and the carrying of supplies is much simplified. In the hand oil can the use of this same oil will be found effective. While it does not work into tightly-fitting bearings so rapidly as does a thin machine oil, it does not run through so badly and stays much longer in such hand-lubricated parts as distance rods, springs, steering links and so forth. Of course, a cheaper oil would answer for these bearings, as high-fire resisting qualities are not demanded, but the extra expense involved in using cylinder oil is more than warranted by the convenience of dealing with but a single quality.

GREASES.

The use of greases for the lubrication of important automobile shaft bearings seems to be considerably on the increase. Their use is very attractive on account of the cleanliness with which they may be applied, their freedom from any tendency to drip from the bearings and the convenience with which they may be carried about. The ordinary greases on the market consist of mixtures of lime soap (usually prepared from an animal fat) and mineral oil sufficient to give the required consistency. Authorities upon lubrication are not enthusiastic as to the value of mixtures of this kind, on the ground that the soap is a poor lubricant, that the animal base is corrosive when decomposed and, furthermore, that greases do not have the power of freely forming protective films between metal surfaces by capillary action as do liquid oils. There are on the market, however, lubricants of the consistency of grease which are known as solidified oils, NON-FLUID OILS, and so forth. These greases are claimed to be entirely mineral in their origin. If they are waxy in texture and contain paraffine-like hydrocarbons, they are of very slight lubricating value. If vaseline is the base underlying their composition, they may be of some efficacy. There are alleged secret processes for solidifying mineral oils into purely mineral greases which it is claimed do not involve the use of deleterious chemicals or methods of treatment. "Non-fluid oils" are being largely used for the lubrication of engine bearings and even for crank pin bearings in some instances. It is almost universal practice to supply these lubricants from compression grease cups which are given a turn or two by hand whenever convenient and the grease thus forced into the bearing under considerable pressure. Occasionally automatic grease cups are employed which are fitted with spring plungers to create the necessary pressure.

GREATER CLEANLINESS.

In ordinary mechanical practice the use of grease lubrication is more frequent among crude, rough machinery in which very heavy pressures and low speeds are common than it is on engines and other fine machines of the same class. However, grease lubrication for automobile engines seems to be increasing very rapidly, and it may be that the absence of "sloppiness" and the dripping of liquid

and the less dust which collects upon external surfaces warrant the use of semi-solid lubricants even though their efficacy as friction reducers as compared with oils may yet await demonstration. A bearing requires to be specially prepared to fit it for grease lubrication. Grease ways of liberal depth leading from the admission hole should be cut in the bushings to convey the somewhat immobile lubricant to all parts of the frictional surfaces. A grease of a considerably less degree of solidity should be used during cold weather, otherwise bearings supplied with it become very "stiff." In general, it may be said that if a pure mineral grease can be found the lubricating value of the materials of which is equal to that of fluid oil, and if this semi-solid material can be made to permeate all parts of the frictional surfaces, its use should possess decided advantages over the employment of liquid oils. Effective automatic means for feeding greases are at present a desideratum as the usual method of supplying them, "when one thinks of it," is somewhat irregular and uncertain. The writer is naturally conservative, and realizing that liquid oils have proven good lubricants for some time past, is not in favor of changing to the solid variety until their superiority is fully demonstrated, as very likely it soon will be. As to using the cheap, soapy greases which are so common, he is perfectly satisfied to have the "other fellow" try them on his engine first.

FOR GEAR FACES.

For the lubrication of gear faces quite a viscous oil is required—one that will not be pressed from between the engaging teeth of the gears in ordinary use. Gears being usually enclosed in an oil-tight case, it is customary to allow one or more of the larger ones to dip in this heavy oil and to splash it over the faces of the others. If an oil of exceedingly high viscosity is used and the gears are allowed to dip almost their full radius, a very considerable amount of power may be wasted when running at high speeds. It is generally sufficient to have say two gears dip rather lightly into the liquid. As there is no high temperature to be resisted by the lubricant, a mineral oil of a relatively cheap grade may be employed successfully.

Oils suitable for this use and known as gear case oils are upon the market. As a rule the heavier grades of these oils are preferable.

GREASE IN GEAR CASE.

The practice of placing greases or other solid lubricants in the gear case instead of a liquid oil is rather questionable. The solid lubricant is forced or worn away from contact with the rapidly revolving gears, and it is only when the car is still and the temperature warm that the grease will again settle around the moving parts and re-lubricate them. Depending for lubrication upon any material which cannot spread or move under the influence of gravity or capillarity is hardly a safe proposition.

CHAIN LUBRICATION.

For the chains it will be found that an immersion of an hour or two in gear case oil after they have been thoroughly cleaned will perfectly lubricate the pins. The chains may then be wiped off externally and after putting them in place a liberal coating of graphite grease may be given the blocks or rollers and the sprocket teeth. Graphite grease is usually a lime soap with a certain admixture of mineral oil into which has been incorporated finely divided graphite. In some cases a vaseline or petroleum jelly which has been filled with graphite is used.

ANTI-FRICTION BEARING LUBRICATION.

For the lubrication of the ball or roller bearings, so generally used for the support of the front wheels and the rear axles of automobiles, a packing of compound filling the space in which the balls or rollers travel upon their cups and cones, is usually adopted. This compound is usually a vaseline or petroleum jelly, and has the advantage of not escaping rapidly from the bearing. The rolling action of the balls or rollers keeps it well distributed, and, as this type of bearing does not need a large amount of lubrication in any event, the results are most satisfactory. If the balls or rollers are contained in a cage, the interstices of this may be filled with the compound which will last for a long time. A bearing of this kind furnishes an instance where a semi-solid lubricant may be used to very great advantage.

CONCLUSIONS.

In closing, let stress be laid upon a few points, among which are the following:

Do not employ anything but purely mineral lubricants if it can possibly be avoided.

Take special pains to follow the advice of the manufacturer of your particular car in regard to the cylinder oil best adapted to be used upon it.

Adopt, if possible, a brand of cylinder oil of established merit, which can be obtained anywhere and of uniform quality.

If practicable, adopt a grade which is not too viscous for general lubricating purposes and thereby preclude the necessity of carrying more than one grade.

Do not discard the use of liquid oil in favor of greases until it has been demonstrated that it may be done without danger.

Before adopting greases, be sure that there are means provided to insure their spreading properly throughout the bearings.

It pays to be conservative in the matter of lubricants and not experiment too much.

The Gyroscope--I.

By E. J. Stoddard.

The gyroscopic action of the fly-wheel must certainly influence the steering of an automobile, and the strength of the frame and adjacent parts should be proportioned to resist the anomalous stresses brought into play by the spinning wheels. Moreover, in the consideration of this subject, we may find an explanation of the fact noted by Mr. Clough, that the power required to drive the heavier vehicles is sometimes less than that required by the lighter. We believe Professor Perry suggests the last consideration in his "Spinning Tops." The study of the subject would therefore seem to promise results.

Howard E. Coffin, in charge of the Experimental Department of the Oldsmobile Company, has constructed the experimental apparatus illustrated in the accompanying drawings, after designs by Fred R. Murdock and myself, and experiments have been made with it by R. D. Parker, an engineering student at the University of Michigan, under the direction of W. L. Miggett, Superintendent of the engineering shops.

Referring to the drawings, Fig. 1 is a side elevation of the device, its vertical shaft A being supported between the live spindle B of a drill-press and a centering point C bolted on the bed of the machine. Fig. 2 is an elevation looking from the left of Fig. 1. Fig. 3 is a plan view, the shaft A being sectioned just above the arc-shaped lug D, which lug serves to limit the upward turning motion of the wheel E and its pivoted supporting arm F. Fig. 4 shows a section of the wheel and its hub.

The vertical shaft A is formed at its upper end to fit into the socket of the drill-press spindle B, and has pivoted at its sides at its lower end, two flat steel bars, F. F. (See Fig. 3.) Between the outer ends of the bars F F is securely bolted a rectangular piece of steel *f* (Figs. 3 and 4), upon an extension of which is the arbor and the ball-bearing upon which the wheel E turns. (See Fig. 4.)

The wheel is made of brass, accurately turned and balanced, and has a steel band a quarter of an inch thick, shrunk around it. The wheel weighs 24 lbs., and its center is 6 inches from the center of the pivot *a*.

Two lugs G are riveted to the vertical shaft A, one on each side, which lugs prevent the arm F from falling below the horizontal, but permit it to rise, as indicated by the dotted lines in Fig. 1.

Fig. 5 shows a photograph of the apparatus mounted in a drill press at the university shops. H is an electric motor by which the wheel E is spun, by means of the belt h. When a sufficient angular

speed has been given to the wheel E, the drill-press spindle is set in motion and the wheel rises promptly until stopped by the lug D, as indicated by dotted lines in Fig. 1. At X (Fig. 5) is shown an apparatus for measuring the force or torque necessary to keep the wheel rotating about the drill press spindle. The speed of the drill press spindle is 12.8 revolutions per minute.

Fig. 6 shows, by the upper line, the rate of falling off of the angular velocity of the wheel when the drill press spindle is not turning, and, by the lower line, when the spindle is turning at its normal rate, 12.8 r. p. m. There seems to be a little more friction in the latter case, as indicated by the somewhat greater slope of the line, but the difference is not very great. In the latter case, the wheel lost 500 r. p. m. more in ten minutes than in the first case, or 50 r. p. m.

The method of estimating the rate of spin of the wheel consisted in giving the wheel the known maximum velocity that the motor would turn it, and then waiting a certain length of time until the diagram (Fig. 6) indicated that it should have fallen to the required velocity; this method is rather rough, but approximate.

If we represent the angular velocity of the drill-press spindle by ω the angular velocity of the wheel by Ω and the amount of inertia of the wheel about its center by I, the torque tending to turn the wheel upward around the pivot of the horizontal arm F, is

$$T = \omega \Omega I, \text{ -- -- } (1)$$

or if we wish the answer in feet and pounds,

$$T = \frac{\omega \Omega I}{32}; \quad (1a)$$

or, reducing the angular velocities to revolutions per minute, and denoting the latter by r and R, respectively.

$$T = .01096\, r \text{ R I foot pounds } (2).$$

The moment of inertia I of the wheel is about .0837 engineers' units. As the weight of the wheel is about 24, the effective weight of the arm about 2 pounds, and the length of the arm, 6" = ½' or 5'—the torque necessary to raise this wheel is 26 x .5 = 13. Substituting this value for T in (1), 12.8, the r. p. m. of the drill-press spindle, for r, and .0837 for I, we obtain the value for R, the r. p. m. of the wheel, thus:

$$13 = (.01096)\ (.0837)\ 12.8\ \text{R}$$

$$\therefore \text{R} = \frac{13}{(.01096)\ (.0837)\ (12.8)} = 1107$$

We found that if we speeded the wheel up to its limit, and allowed it to run a little over two minutes and then started up the drill-press, the wheel would just sustain itself. This is as close a correspondence between theory and practice as one could expect, as it will be noticed by Fig. 6, that after running two minutes the wheel will be making about 1,100 r. p. m., while our figures give 1,107.

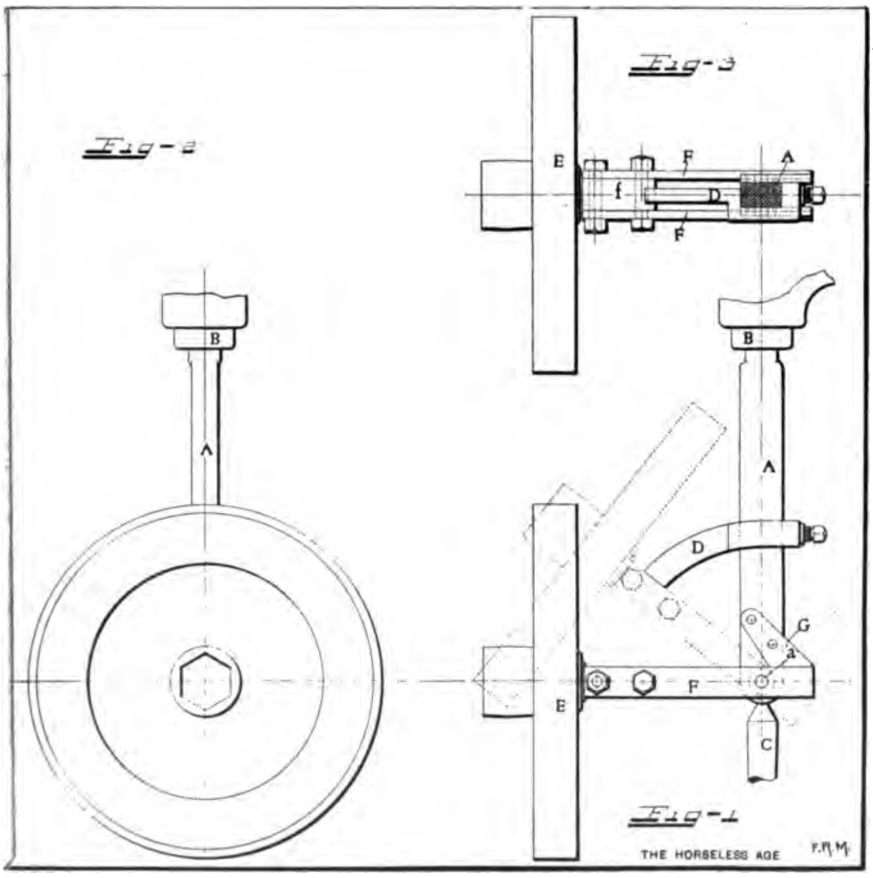
DERIVATION OF EQUATION.

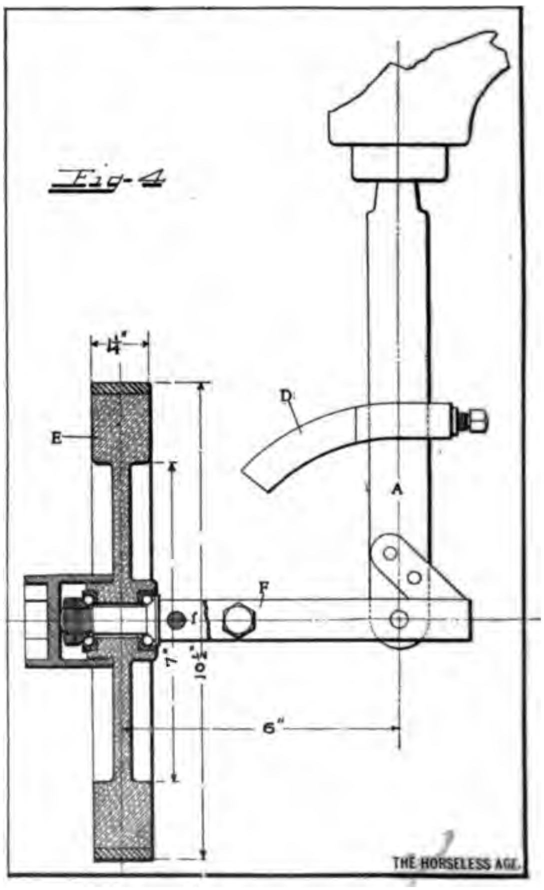
Frequently when one comes to consider practical problems, he has largely forgotten his analytical mathematics, even if he has facility in this line. The treatments of the subject of this article that I have seen in the books is calculated to dismay all but those who have algebraical transformations at their fingers' ends. I have therefore attempted to derive the equation expressing the resultant torque, or effort to precess, geometrically and as directly as possible from physical laws. I hope the results will be useful to some. In the course of the work, Professor Alexander Ziwet, of the University of Michigan, has been so kind as to disabuse me of a number of errors that I had fallen into.

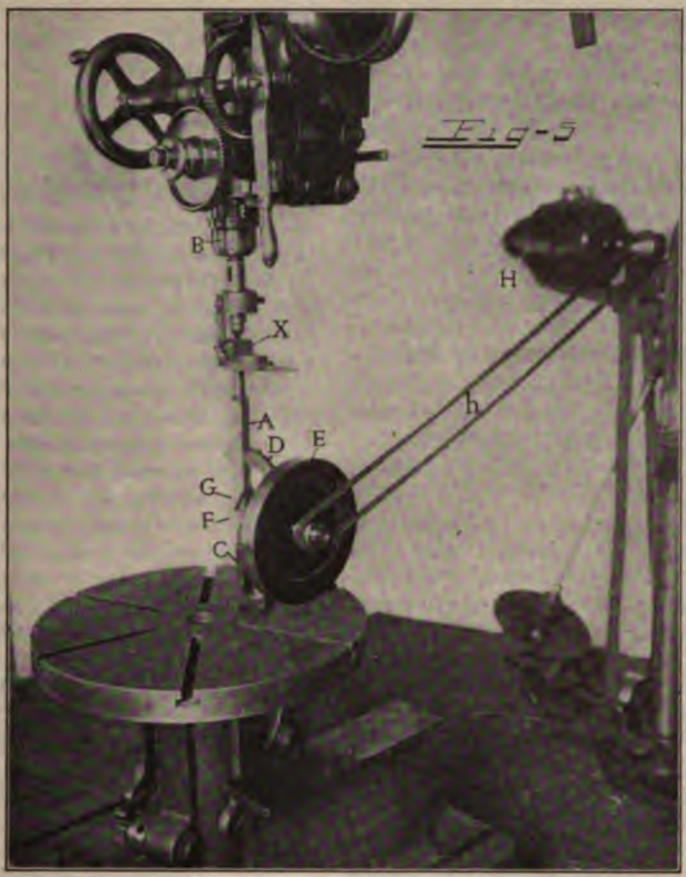
When we consider that it takes 1-32 lb. or ½ oz. of force to change the velocity of, or accelerate, a pound of mass one foot per second, and that the acceleration is directly proportional to the force and inversely proportional to the mass, we are prepared to understand the relation between rectilinear velocity and force without any trouble, and make almost all calculations in our heads. But when we come to consider the case of a body endowed with both a rectilinear and a rotary motion, we must go one step further, and it is not quite so simple.

Frequently the consideration of a subject is very much simplified if we suppose an instantaneous action to continue constant for a unit of time for instance, one second.

In Figs. 6 and 7 let A be a heavy particle having a rectilinear velocity V in the







direction indicated by the arrow head, which would carry it into B in one second; A—B is then the rectilinear velocity of A.

Now, suppose the direction of V to be continually changing with a uniform angular velocity ω = angle B A C, per second, and let it turn about the initial position of A. If this instantaneous action were to continue for one second, the particle A would at the end of that time obviously be traveling with a velocity B—C $= \omega$ V, due to the rotation of the velocity. In this supposed motion, the velocity of the particle at A due to the angular velocity is nothing, after one second it is B C $= \omega$ V, consequently ω V is the change of velocity per second, or the acceleration due to the rotation of V with an angular velocity ω.

As acceleration is a rate or ratio, it is perfectly proper to consider that the instantaneous actions continue for unit time. The acceleration multiplied by the mass is the force, consequently the force necessary to rotate the velocity V with an angular velocity ω is

$$F = \omega\, V\, m$$

(See "Worthington's Dynamics of Rotation," pp. 146-147. Longmans, Green & Co.)

THE GYROSCOPE.

In Fig. 8 let the circle R R represent the rim of a wheel spinning about an axis at C perpendicular to the paper, in the direction indicated by the arrow, with a constant angular velocity Ω radians per second, and let it be rotating with an angular velocity ω about the diametral axis $f\ f$, so that, for example, the upper part of the circle is receding from the observer. We will speak of the first angular velocity, Ω, as that of "spin," and the second, ω, as that of "rotation." The result is a torque about the axis, $g\ g$, at right angles to the other two axes.

Any particle P is subject to accelerations due to two distinct causes. The point P has a tangential velocity $\Omega\ r$, where r is the radius of the circle, and it has also a velocity

$$\omega\ \overline{P\,D} = \omega \sin\theta\, r$$

perpendicular to the paper. This results in a rotation of the velocity $\Omega\ r$ about the point A with angular velocity $\dfrac{\omega\ \overline{P\,D}}{\overline{A\,P}}$

The triangle A P D is evidently similar to the triangle C P D, therefore

$$\frac{\overline{P\,D}}{\overline{A\,P}} = \frac{\overline{C\,D}}{\overline{P\,C}} = \cos\theta —$$

The angular velocity at which the tangential velocity $\Omega\ r$ is rotated is therefore $\omega \cos\theta$. The linear acceleration of the point P from this cause is therefore $\omega\, \Omega \cos\theta\, r$ and if m is the mass of the particle, the force due to this acceleration is $\omega\, \Omega \cos\theta\, r\, m$. This force is perpendicular to the paper, and its torque about $g\,g$ is $\omega\ \Omega \cos\theta\ r\ m\ (\cos\theta\ r)$, $\cos\theta\ r$ being the lever arm at which the force acts. Multiplying the factors together, we have

$$\omega\, \Omega \cos^2\theta\, r^2\, m$$

But $\overline{P\,D}$ is increasing in length. Consequently the velocity $\omega\ \overline{P\,D}$ is being accelerated for this cause also. If we resolve the tangential velocity of P into its horizontal and vertical components, we shall have the triangle P—$a\ b$, in which $a\ b$ represents the velocity with which P D is increasing in length and P b represents the tangential velocity. The ratio of these two is

$$\frac{\overline{a\ b}}{P\ b} = \cos\theta,$$

because triangle P a b is similar to triangle C P D. But P b represents the velocity $\Omega\ r$, therefore $a\ b$ represents $\Omega\ r$ $\cos\theta$, and this is the rate of increase in length of $\overline{P.\ D.}$ The acceleration of the velocity ω P D is, therefore, $\omega\ \Omega\ r\ \cos\theta$. The force due to this acceleration is

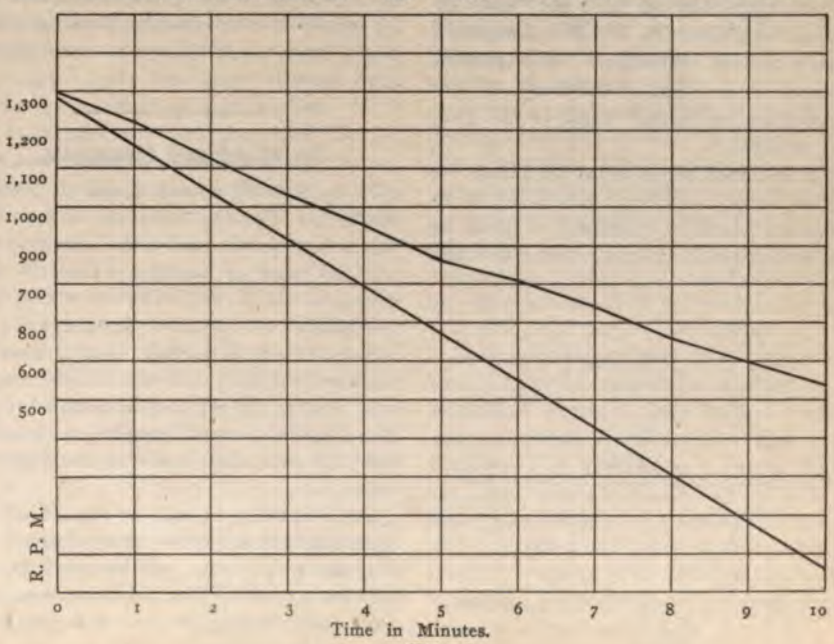


Fig. 6.

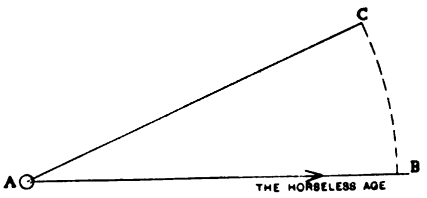


FIG. 7.

$\omega\,\Omega\,r\,\mathrm{Cos}\,\theta\,m$, and its torque about $g\,g$ as before is $\omega\,\Omega\,r^2\,\mathrm{Cos}^2\,\theta\,m$.

The total torque due to the two separate accelerations of the point P is therefore

$$\omega\,\Omega\,\mathrm{Cos}^2\,\theta\,r^2\,m + \omega\,\Omega\,r^2\,\mathrm{Cos}^2\,\theta\,m = 2\,\omega\,\Omega\,\mathrm{Cos}^2\,\theta\,r^2\,m.$$

To obtain the total torque of all the particles in the quadrant, we substitute for m, the mass of the particle, the mass m_2, of the entire quadrant, and for $\mathrm{Cos}^2\,\theta$ its mean value for the quadrant. Professor Alfred Hay in his "Alternate Current Working" §57 derives this latter value in the following manner:

$$\mathrm{Sin}^2\,\theta + \mathrm{Cos}^2\,\theta = 1$$

But the sine and cosine pass through precisely the same values, and must therefore have the same mean or average values. Now the only values that will satisfy the above equation are $\mathrm{Sin}^2\,\theta = \frac{1}{2}$, and $\mathrm{Cos}^2\,\theta = \frac{1}{2}$ therefore the mean or average value of $\mathrm{Cos}^2\,\theta$ is $\frac{1}{2}$—

Substituting this value of $\mathrm{Cos}^2\,\theta$ in $2\,\omega\,\Omega\,\mathrm{Cos}^2\,r^2\,m_2$ we have for the total torque of all the points in the quadrant $\omega\,\Omega\,r^2\,m_2$ and for the total torque or turning moment of the whole wheel or circle R R, $\omega\,\Omega\,r^2\,M$, where M is $4\,m_2$ or the total mass of the wheel rim.

But $r^2\,m$ is the moment of inertia about c, which we have represented by I, therefore finally we have

$$T = \omega\,\Omega\,I$$

The clearest and simplest discussion of the gyroscope that we have seen may be found in Professor A. M. Worthington's "Dynamics of Rotation" (Longmans, Green & Co.). The derivation of the equation, as he himself says, is not perfectly general.

To prove that there is no resistance to the turning of a spinning wheel, so as to change its plane of rotation, so long as there is no rotation about an axle at right angles to the axis of the other two rotations, we set the wheel herein illustrated spinning with a velocity too small to lift it from the lugs when the press-spindle was turning. We then set the spindle in motion and tried to measure the force exerted by the spindle to keep the wheel revolving. After the apparatus attained a constant velocity, no force or torque could be observed.

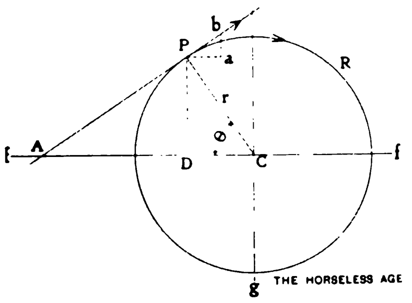


FIG. 8.

The Automobile Movement in India.

An Automobile Association has been formed for Western India. At a recent meeting of automobilists held in Bombay the objects of the association were agreed to as follows:

"The encouragement and development in this country of the motor and other allied industries. To supply a center of information and advice on matters pertaining to motor vehicles. To afford to its members its support in the protection and defense of their rights whenever menaced. To allow members oportunities of reading periodicals and other literature pertaining to the industry. To afford members information and advice connected with the automobile movement. To watch the progress of automobilism, and generally to protect and encourage the same. To cultivate reciprocal relations with kindred institutions in other places. To organize exhibitions, competitions, and excursions from time to time."

On the eastern side of the continent automobilists are equally energetic. An Automobile Association of Bengal has been formed. They have established themselves in the Asiatic Society's premises at 57 Park street. The honorary secretary is J H. H. Rolfe. It is stated that about fifty cars have now been registered in Calcutta, exclusive of motor bicycles. It is clear from the formation of these two associations that the automobile movement is making considerable strides in the Far East.—*Automobile Club Journal.*

An Abandoned Automobile.

F. E. Newell, a coal dealer of Melrose, Mass., on Tuesday morning of last week found a gasoline automobile standing outside his place of business, evidently abandoned by the driver. The car was a Winton phaeton with wire wheels, and bore a license tag numbered 1883. After the machine had been there for at least twenty-four hours and no one had called for it, Mr. Newell decided to give it shelter in his coal yard and wait for the owner to claim it.

On Thursday he was in receipt of calls from numerous people, who claimed that they were the owners of the machine, but, inasmuch as Newell could not see how the auto could belong to half a dozen people at once, he declined to part with it. Some who were afraid to apply personally called him up over the telephone and attempted to persuade him that they were the rightful owners.

During the afternoon a man came into the police station and said the machine belonged to a "Dr. Plummer" of Malden, but when the officers requested him to sign his name to an official document he rushed out of the office without leaving his name.

Later the machine was claimed by the Melrose police, who said that as it was found on the public highway it should be in the custody of the city and be turned over to them until the owner applied. Mr. Newell failed to see the matter in that light, and said he was going to hang on to it. He thought of charging $10 a day for storage rent, and at that rate he would own the auto anyhow in a few days.

No one saw the auto arrive. The only theory advanced is that some one must have stolen it, and while going through Melrose the machinery broke down, and rather than attract attention by stopping for repairs concluded to desert the carriage.

The number 1883 was looked up on the register and stands opposite the name of Frank L. Rust. Mr. Rust said the machine was his, but he sold it some time ago to parties unknown.

Exports in July.

During the month of July last there were exported from the United States automobiles and parts to the value of $183,180, as compared with $159,739 for the same month a year earlier. During the first seven months of 1904 the exports of autos and parts amounted to $1,154,196, the corresponding figures for last year being $878,179.

Alcohol From Sawdust.

Alcohol from sawdust has recently been produced in Norway. According to the chemist who has invented the process, 100 kilogrammes of sawdust are made to yield from six to seven kilogrammes of alcohol, together with by-products of acetic acid and methyl alcohol. The saving in price is represented by the difference, $10, the cost of 100 kilogrammes of potato alcohol in Norway, and $6, the cost of the same amount of alcohol made from sawdust.

Calendar of Automobile Dates and Events.

Aug. 29—Sept. 3.—A. C. Y. B. I. Reliability Trials.
Sept. 10.—R. I. A. C. Race Meet, Providence, R. I.
Sept. 24.—Race Meet at Empire City Track, Yonkers, N. Y.
Oct. 14-22.—Leipzig Automobile Show.
Dec. 9-15.—Paris Show.

Henry Sturney estimates that of the 21,000 cars in use in Great Britain, three-fourths are of foreign manufacture.

MAINTENANCE AND REPAIRS

The Care of Tires in Use—Wear Due to Faulty Conditions of Tire Itself.

While it is undoubtedly true that the average motorist has much to learn in regard to the proper treatment and care of pneumatic tires, it is also true that a very large part of what has been written on the subject may be summed up in the phrase "Use common sense." The extent to which detailed "don'ts" have been indulged in is appalling, and would seem superfluous. Such injunctions as "don't draw a file across an inner tube," and don't draw an inner tube across the floor, especially if the floor be oily or is apt to give off splinters," would appear to be necessary only to an intellect considerably below that of the average motorist.

The properties of rubber are to an extent apparent, and if its peculiarities are kept constantly in mind by the automobilist, he is not likely to injure his tires in handling them. If he asks himself as each problem presents itself, "Can this in any way injure the rubber or fabric, or affect their proper adhesion?" he is quite certain to arrive at the correct conclusion. Herein lies the application of common sense. No book has been made large enough to contain all the detailed "dont's" which might be set down and should be followed if the life of the tires is to be prolonged to its absolute limit, and if such a book were written it would be simply an elaboration on common sense as applied to motor tires.

Practical experience has shown that excessive wear on tires is commonly produced by a set of causes which have their origin in the condition in which the tires are kept, and the frequency with which this sort of wear is found makes it possible for us to set down and discuss herein the more common of these causes without fear of appearing to be indulging in a statement of self-evident facts.

IMPROPER ATTACHMENT.

Improper attachment of the tire to the rim is certain to result in trouble before many miles have been covered. In an earlier article we endeavored to show how the inner tube might be caught between the shoe and the rim, or between the shoe and a retaining stud. The results of such pinching are obvious. The portion of the tube near that which is caught is subjected to increased strains while in a stretched condition, and the tube will soon burst or tear at the point of pinching. It may happen that the outer show is not caught properly between the rim and a bolt. If such be the case, damage to the show may result, and, in the case of many tires, the inner tube may blow out through the space between the shoe and rim near the improperly set bolt.

BENDING OF RIM.

If, for some reason, the edge of a rim becomes bent in any way, the dent should be removed as soon as discovered, for, if the bend is inward, a greater pressure is brought upon the shoulder of the shoe at that point, and any chafing will wear the outer protecting cover and weaken the shoulder at that point. If, on the other hand, the bend is outward, there is chance for water, oil and sand to work in between the tire and rim. Water would tend to rot the canvas in the shoe, to rust the rim and to destroy the rubber, and sand to aggravate wear on the shoe.

EFFECT OF RUST.

Iron rust, as is well known, rots canvas very quickly, and for this reason water should be kept from reaching the rim. Assuming that the rim is clean, as, of course, it should be, when the tire is attached it may be kept so indefinitely if proper attention is given to the wheels. The retaining bolts and locking nuts on the valve stem should be carefully inspected at intervals, to make sure that they are drawn sufficiently tight to prevent any water from working in through the holes in the rim. If they are not tight, it is possible for water to work in between the rim and shoe, which, besides causing a certain amount of rotting itself, will soon rust the rim, and this rust will rapidly increase the rate of decay. The possibility of water reaching the rim also arises if the tire is not properly inflated. The rusting usually starts at the very edge of the inside of the rim, and if the faulty conditions which made its beginning possible are not corrected, it will spread until it has reached the canvas, through which it will travel rapidly. If a rim has become rusty, even though merely in small spots, such rust should be carefully removed with emery cloth, and the inside of the rim given a very light coating of lacquer or thin shellac. It is well to remove the tires from the rims at reasonable intervals, make a careful inspection of the inside of the tire and of the rim, and correct any faulty conditions before serious harm may come from them.

LOOSE RETAINING BOLTS.

Loose retaining bolts may be responsible for more trouble than that caused by letting water into the tire. If the bolts do not clamp the shoe securely to the rim, the latter may "creep" and thereby bring a strain upon the valve stem which will tend to tear it from the tube. They would also stimulate wear on the inner edge of the shoe and might cause a chafing of the inner tube. The tires of the driving wheels require particular attention in this regard, as the driving effort will tend to increase the "creeping." In the case of the tires on the steering wheels, any slackness of the bolts may, if the tire is not sufficiently inflated, permit of a certain amount of play between the rim and shoulder, and in negotiating curves at any degree of speed, there is increased likelihood of a tire becoming detached for at least a portion of its length, allowing the inner tube to burst out.

Insufficient inflation of a tire has certain other evil effects besides those mentioned. Under the weight of the vehicle, a partially inflated tires takes the shape of a flattened arch the curvature of the outer ends of which varies in acuteness inversely as the pressure within the tire. As the wheel revolves, this bending, as it were, of the tire in contact with the ground, causes an unequal stretching of the combined rubber and canvas in the outer shoe which tends to tear them apart. Insufficient inflation also increases the liability of puncture, as a larger area of the tire surface is in contact with the ground and exposed to puncturing influences. The liability of bending the rim is also increased.

PRESSURE OF INFLATION.

Much theorizing has been done on the subject of proper inflation pressures, but when all is said and done, there is only one final test which is of any practical value. A tire should be pumped up until it is capable of holding its shape, and yet does not transmit every small shock to the axles. This may seem a bit indefinite, but it is as accurate a statement of proper tire inflation pressure, all things considered, as can be given. As was stated in a communication in last week's issue, the pneumatic tire is, in the case of any but a racing car, intended to absorb all small road shocks. If it is too highly inflated it will not do this, and if it is insufficiently inflated it will not hold its shape under the weight of the car and the results set down herein will follow. In pumping air into a tire, an ounce of common sense is worth a column of pressure tables.

There is an evident lack of appreciation among motorists of the importance of having small cuts which extend through the outer layer of rubber on the outer shoe sealed up as soon as possible. Water and sand get into such cuts and will in time cause blisters which gradually increase in size until an extensive repair is necessary. The water will also tend to rot the canvas.

It is well known that in a long run the tires become considerably heated. This heating is caused largely by the frictional action between the outer shoe and the air chamber. To avoid it to a degree, French chalk or talc should be rubbed over the inner tube before it is inserted in the shoe; this acts as a lubricant and reduces the friction between the two surfaces to a minimum and consequently diminishes the amount of heat generated.

Resetting a Flywheel Worn Loose.

BY JOHN P. CONKLING, M. E.

A short time ago my attention was called to the condition of a flywheel (Fig. 1) on the engine of an automobile. The wheel was quite loose on its shaft, the bolts and keys used to hold it in place having worn so that it was dangerous to operate it. I was consulted as to the best method of repairing it.

This wheel was constructed of cast iron. Its center, or that portion where the spokes usually are found, was in the form of a solid disk ⅜ in. thick. Surrounding the periphery of this disk, and cast with it in one piece, was a rim 2 in. thick and 1⅝ in. wide. The rim and the disk were symmetrical about the same central plane. So that the rim projected an equal distance beyond the face of the disk on each side of the wheel.

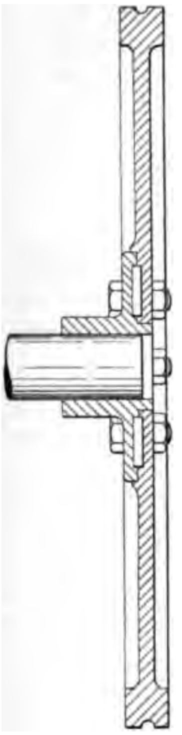
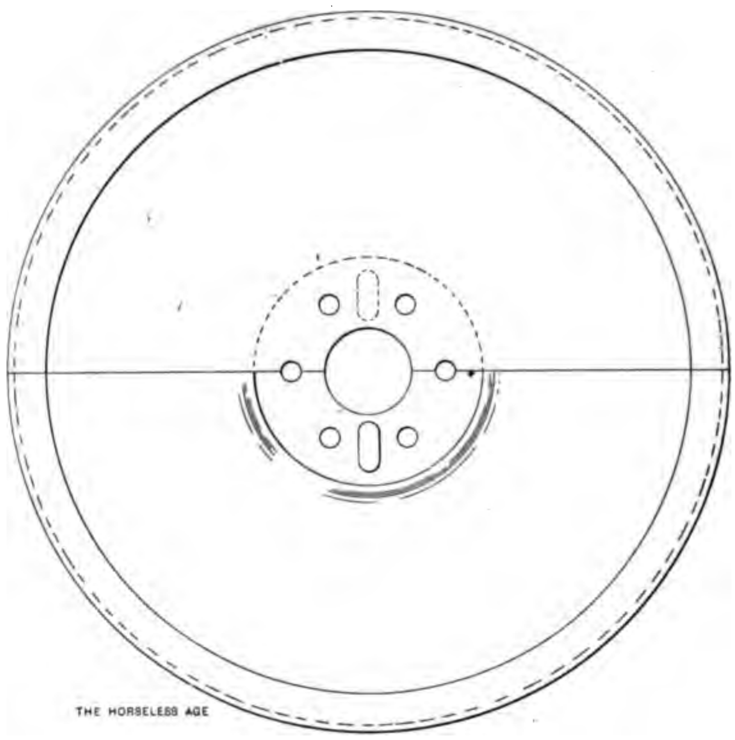


FIG. 1.



FIGS. 2 AND 3.

In the center of the face of the rim, there was a semi-circular groove about ½ in. wide, and ¼ in. deep, which extended all around the rim. As there were no hubs or projections of any kind on the faces of the wheel, by means of which the edges of the rim would be kept clear of the floor upon which it rested, when removed from its place on the engine shaft, this groove was cut to give a finger hold, so the wheel could be lifted from its place.

The front or outer face of the disk was perfectly smooth and plane (Fig. 2), except at the center, where there was a hole 1⅜ in. in diameter. Surrounding it were six bolt holes, each 7-16 in. in diameter, which were designed to assist in attaching the wheel to the engine shaft.

The rear or inner face of the wheel (Fig. 3) had the same appearance as the front face, except that there was a little ring, 4 in. in inside diameter, 3-16 in. in thickness and 3-16 in. in width, with a little fillet all around the outer rim, which blended the ring into the disk with which it was cast, solid. The center of this ring was coincident with that of the flywheel and engine shaft. There were also two milled depressions or key seats on the face of this disk inside of the ring each of which was 7-16 in. wide and 3-16 in. deep; they were each ¾ in. long, and each end of each depression was semicircular in form. These keyseats were diametrically opposed to each other, and each commenced and terminated at points equidistant radially from the center of the flywheel.

On the outer end of the one inch diameter engine shaft (Fig. 4) there was a 4 in. forged steel disk, ⅜ in. thick with hub next to the engine, 1 in. long and 1¾ in. in diameter; on its opposite face was a smaller hub, ⅜ in. long and 1⅜ in. in diameter. This hub was turned to fit closely into the hole in the center of the flywheel, and the periphery of the 4 in. disk was turned to fit closely into the 4 in. ring cast onto the rear face of the flywheel. In this disk were holes corresponding to those in the rear face of the flywheel. They were so located as to accurately coincide with their counterparts in the rear face of the flywheel, the keyseats forming beds for two radial keys, which when in place were buried out of sight between the two disks.

The two radial steel keys (Fig. 1) were so fitted that when the disks were drawn together by the bolts, the keys were forced tightly into their seats, and formed a perfect driving device for the flywheel. So long as the bolts held the disks tightly together, there was no trouble with the wheel.

Much usage and frequent adjustment had so worn the bolts and bolt holes in these disks, and the threads on the bolts and nuts, that, as there was no locking device on the nuts, it was impossible to keep the two disks tightly together long, after the engine was put in operation.

This condition of the bolts had frequently permitted the disks to become slightly separated, and opened a trifling space in the beds of the radial keys, which increased the flywheel's leverage on the bolts. Under such slight leverage the continuous changes in the speed of the engine soon hammered these parts, so that there was considerable vacant space around the keys and bolts. The hammering continued whenever the engine was in use until the owner became alarmed at the noise and thumping produced.

When I examined the wheel, it could be turned forward and back about ¼ in., measured on the periphery of the wheel, and could be moved sideways about ⅛ in., while the bolts were in place.

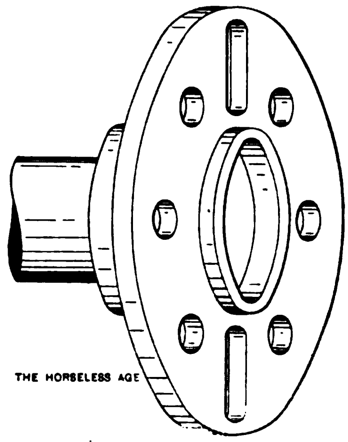


FIG. 4.

While the vacancies surrounding the keys, bolts, hubs and disk were not sufficient to appear at all alarming when examined while not in motion, the effect produced upon the occupants of the car at 900 revolutions of this 75 pound unbalanced flywheel, was far from pleasant.

The wear was not sufficient at any one point to permit of inserting a bushing or shim which would last any length of time. So I advised peining carefully with a one-pound ball pein hammer (Fig. 6) at about 6 in. drop; all around the edge of the center hole, about ⅛ in. to ⅜ in. back from its edge on both sides of the flywheel, and to do the same to the outer edge of the 4 in. ring on the rear face of the flywheel. To do this satisfactorily it was necessary to place the flywheel on a heavy anvil (Fig. 7), or smooth heavy piece of metal, to secure the resistance necessary to expand the metal equally throughout the thickness of the disk.

A 3½ in. disk of steel was used between the anvil and the wheel, to lift the rim and

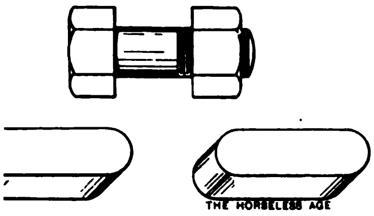


FIG. 5.

lear of the anvil. After peining care-
several times around the center hole,
h faces of the flywheel disk, and sev-
imes around the outer edge of the
n the rear face of the flywheel; these
ters were so reduced that they fitted
tly onto the forged steel disk and
n the end of the engine shaft.
wage with a convex face of nearly
me form and size as the radial keys
sed to expand the keys. They were
l upon the anvil and treated in the
manner as the wheel, with the excep-
hat the convex face of the swage and
e ball of the hammer came in contact
the face of the keys. The broad face
: hammer being used to hit the swage,
keys were each in its turn so swaged
y swaging first one side and then the
, until they were evenly expanded so
fit tightly into their places.
is work of expanding by swaging and
ng was done so evenly as to present
ed bearing surfaces, showing no in-
ities and no unsightly bruises on the
ces where the peining was done. The
ng and swaging was completed in
: three hours.
the addition of six new bolts, which
tightly fitted into the bolt holes, and
ied with tightly fitting nuts, and ex-
r lock nuts on each bolt, the work was
leted, the whole job occupying about
hours.
performing this operation, the ball
end of the hammer should be used.
progress of the hammer around the
should be very slow, apparently strik-
lightly many times in the same place,
gradually and continuously working on-
l around and around the circle, until
desired reduction in the diameter of
central hole is secured. This can be

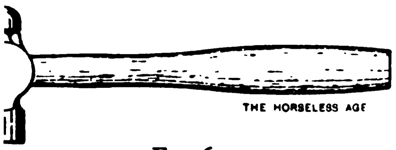


FIG. 6.

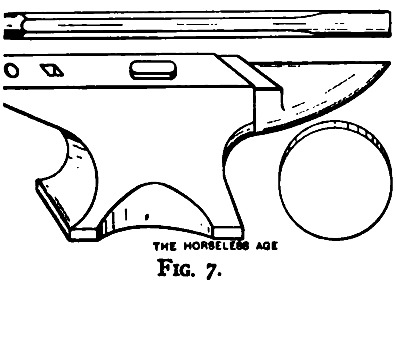


FIG. 7.

determined by the use of callipers, with which the diameter should be frequently tested during the operation. Great care should be exercised to prevent the hammer from striking too close to the edge of the hole, as this would produce lumpy work.

When doing such work, the hammer should make about two hundred strokes per minute.

Motor Buses for English Railroads.

The half yearly meeting of shareholders of the Great Central Railway Company was held at London-road Station, Manchester, England, on August 10, Sir Alexander Henderson, Bart., M. P., presiding The president said that their contemplated expenditure included provision for acquiring a number of motor carriages. Replying to questions by shareholders, he said they did not propose to spend a great amount of money on the provision of these carriages. These vehicles were new and had really only been adopted to any extent by the Great Western Company. They appeared to be extremely useful. Some had been put in hand at the Gorton works, and they could be put on the line very shortly. The cost of working them was apparently something between 9 cents and 14 cents per mile. They thought they could very properly be brought into use upon some parts of the system, and if those shortly to be put on did the work quite well the use of them would be extended. He thought it very likely they might use the first cars upon the North Wales and Liverpool section of the line.

An Artist's View on Motoring Abroad.

Joseph Pennell, a well-known artist, has been giving his views regarding motoring in foreign countries as compared to England. He says he never experienced such difficulties when driving in avoiding being smashed up by horse users and reckless misuse of the roads by butchers and brewers, such complete monopolization by drovers utterly incapable of controlling their beasts; such determination on the part of pedestrians to refuse to make way till the last moment, when they suddenly jump straight in front of you—in fact, from all classes of road users such a determination to pester, hinder, and annoy motorists as exists from one end of the land to the other in England. Mr. Pennell is an extremist.

The city of Kiel, Germany, is now being supplied with milk twice daily from in the neighborhood of Pretz by means of motor-propelled milk wagons. The first delivery is early enough to allow of the milk being used by the Kielers for their morning coffee, and the second shipment arrives during the afternoon.

LESSONS of THE ROAD

The Practical Side of Operating a Gasoline Car.

BY F. W. BOLANDE.

Gasoline leaks are expensive. Along in the middle of June, when I received my present car, I did not pay much attention to the mileage I was getting. However, after a while my pocketbook flattened out so rapidly that I looked around for the cause.

I then noticed that I was loading up my gasoline tank every two or three days. In fact, I figured it out that I was making only between five and six miles on a gallon of gasoline, whereas a medium two-cylinder gasoline car ought to do fifteen miles on a gallon without much trouble, and I knew something was the matter.

PERSISTENT LEAKS.

The car scented up the carriage house strongly with gasoline, and I had looked casually to see if there was a leak, but hadn't found any. Now I looked in earnest, and found the gasoline dripping in good shape. I could see the dollars and cents running right through the car, and I hurried to the nearest repair station. There I had the leaky joint repaired and went on for several more weeks supposing everything was all right. One day, happening to have my head under the car for some reason, I received a drop of gasoline in the eye. I discovered that the leak was still in operation and once more I hastened to the repair man. This time I was told that the stuffing box leaked. It was tightened, and for a week or two I was serene in the consciousness that I was using all the gasoline in the car. It was a false security, for happening to examine the gasoline system again, the same old dropping was found to be going on.

I went to the repairman with the same old complaint!

This time I was told that there was something the matter with one of the valves and that it did not seat perfectly. The only way would be to have a new valve put in. I took the car to the factory and the gasoline system was all gone over, so that now I am reasonably sure of getting a fair mileage.

LOOSE CONNECTIONS PUZZLING.

What do you do when your engine stops in an unaccountable manner?

I live about six miles in the country during the summer and use the car back and forth every day. I had not been held up with this car until one night last week, when suddenly the engine stopped without warning. I was not yet out of the city.

and so drew up to curb and set about investigating. I could not see anything materially wrong, and had no difficulty in starting the engine. I started the car and again the engine stopped. Then I found I could not get the engine going. The engine did not act as though there were electrical troubles. I decided to send for the repairman. He said that the gasoline was not getting through to the engine as it should. He was in a hurry and did not go over the wiring, or test the gasoline supply. He told me to advance the spark pretty well, throttle the gas down and go back home on low speed. I crawled back a mile successfully and housed the car for the night. The next morning I started bright and early to take the machine to the factory, as it is made in the same city in which I reside. I started on the slowest speed, having no trouble in starting the engine. Before I had proceeded half a mile the engine stopped three times and I gave up in disgust.

I left the machine in front of a factory office and telephoned the automobile factory. They said that they would send for the car right away and would endeavor to get it down without towing. I learned afterwards that the man from the factory started the engine without the slightest trouble, remarking, "Well, I don't see why he left this car here." He went off on high speed, but soon the engine came to a stop. He jumped out of the car and with practiced hand soon located the trouble. A terminal in the battery box had broken. At times there was a contact and the engine would run all right. Then the contact would be broken and the engine would stop. The trouble was soon remedied.

That night I started for the country full of peace and confidence. I had not gone far before the engine stopped unexpectedly, and rudely shattered my dream of bliss. I got out and started it again all right, but as I proceeded on my journey I was apprehensive every minute that it would stop again. It is a great thing to know what your engine stops for, and if it is something that can be remedied you do not mind, but rather appreciate the experience. When, however, the engine stops without apparent cause, you are nonplussed. Everything looks dreary.

I reached my destination without further mishap, but all that evening I thought of that engine and wondered why it stopped. I took out the spark plugs and cleaned the points, dallied with the mixture and gave it a few conciliatory touches. The engine remained mute and refused to tell why it had stopped running.

ABANDONED ON STREET.

The next morning I had no trouble in starting, and tried to forget that the engine had stopped the day before for seemingly no cause whatever.

I stopped at the house of a man who *was contemplating* purchasing an automobile and who is deeply interested in their running qualities and method of operation. As the car stood with the engine running idle, the engine again suddenly stopped and I feared that I was not over my troubles. I got out and looked the car over with the wise look that a man puts on when he hasn't the slightest idea what is the matter. I looked at the battery terminals and they were all right.

"Well," said the man, "this shows that you have to have a machinist or mechanic with you all the time. There isn't much use of running an automobile unless you are a mechanic or have one with you."

"It seems so," said I, "at the same time I've seen gas engine experts fooled and just as much at sea as I am now." While I was talking I discovered that the terminal at the safety plug on the dash was loose. Quickly getting a small wrench, it was the work of a minute to tighten the nut, give the crank a twist, and the engine was humming away as though it never had the slightest idea of cutting capers again.

RATCHET LOCK JARS APART.

One day on coming in from a little run I noticed that the spark lever on the steering post did not make the usual clicking sound when it was pushed either up or down. It works on a ratchet. I could move it as usual, but something about it I knew was wrong. I looked in the end of it and discovered that the screw that was usually there was missing. I looked about on the floor of the car and fortunately saw it lying there. I put it in its proper place, but still no click. I looked around on the floor of the car once more and saw a spring about two inches long. I picked that up, put it in the end of the spark lever, and followed it with the screw, but that made no difference—the familiar clicking sound was absent when the lever was moved. For the third time I scanned the floor of the car and picked up a little bit of steel about three-quarters of an inch long. I loaded up the lever again, first with the piece of steel, second with the spring and third and last with the screw. Then the familiar clicking sound was heard all right.

DISPOSING OF TOOLS.

Although my car is a fairly expensive one for an American car, one thing it lacks is a suitable place for tools. I have seen cars costing four or five hundred dollars less which contained receptacles for tools most conveniently located. One car, I have in mind, has the tools in a little drawer which pulls out from the side of the car. Another has the tools under the foot board, and also under the seat fitted in wood blocks. There was nothing for me to do but to throw the tools loose under the seat, where there is very little room, and risk the danger of chafing the gasoline tank and perhaps causing a leak. I could perhaps put some of them under the tonneau seats, but there they would be unhandy. Or if I didn't want to do that, I could carry them in baskets for which I would have to pay some $50.

I have conceived a better way. A friend of mine who is clever with tools has built a little wooden cabinet which fits in the space between the door under the seat and the gasoline tank. This holds several socket wrenches, the wrench for the wheel hubs, a hammer, file, tire repair outfit, and several other tools. Then he has made straps of galvanized iron which he has fastened to the door under the seat. This carries a Stilson wrench, screw driver, pliers, and six or eight different sized wrenches that are furnished. Included is the immense socket wrench which fits the spark plugs. The manufacturers are extremely liberal in the equipment of tools furnished with this car, but I have managed to take care of them all in this way. Previously I used to tie up two or three wrenches and a pair of pliers in a piece of flannel cloth, so that they would not chafe the gasoline tank and make more trouble. I had to open the door, unwind the string, and take out the tools, and when finished tie them up again. Now I have everything handy and complete.

I am now looking for a place to carry a jack and tire pump without having to expend $50 in baskets. I think that I shall have built in the front of the tonneau a narrow box which will accommodate these useful articles and at the same time not entrench upon the foot room.

Under the Searchlight.

By W. P. Hockley.

"By gum, ain't she a daisy?"

"What 'dye mean, Silas; the machine or the mare?"

"Thet there automobeel. Gosh hang the things. They es scary-lookin' when ye've got a skeetish horse on the road, but"—meditatively—"there's nothin' to beat 'em."

Laughing at the jocose remark of the rural spokesman, the autoist sprang into his car and started. He was on a pleasure trip from Bedford to White Plains to enjoy the splendid run along the new State road.

Speeding along a dustless highway, fringed with charming woodland, farms and attractive homesteads, amid the sweet-smelling essence of vines wafted on a gentle breeze, the air intoxicating in its influence upon the soul, no wonder the world seemed cheerful. The gentle motion of the car gliding along lulled the occupant into a haven of ecstacy. As the scenery changed and a hill seemed to dissolve into space, a beautiful green valley sprang into existence. Here a little turn to the right revealed a historic old farm house, showing signs of the age when our forefathers faced shot and shell. There, swerving gently to the left, the modern up-to-date residence of a city banker, drawn to the country to find

the rest only to be found among the verdure-clad hills.

On and on and the glories of nature appear on every side. It only seems a short time since the starting point was left behind, but here is Wampus Lake, the last of the beautiful sheets of shimmering water to be "confiscated" by New York city for watershed purposes. Gliding along the eastern shore, the sun's rays upon the rocky cliff forming the western boundary, one is carried to the Far West, or the Palisades of the Hudson river. The touring car is running splendidly.

As the Wampus fades from view a wizard waves his magic wand and a fascinating picture of "the old mill" and the picturesque mill-pond next appears on the curtain of nature. Historic as it stands today, it bears the signs of revolutionary times. We are fairly in the siege of encampments now obliterated.

You wonder why this old mill stands here grinding the sustenance for the human body. Alas! it has a history that, could it be repeated, would almost appear beyond the imaginary. Across the way is a barn, crude in its manner, but the prison of the traitor Andre.

Now the road enlivens once more, for two miles through straggling homesteads of every description, handed from one generation to another, the motor car whizzes through the village of Armonk. Like all inland villages, this has gone the way of the majority. While the cities prospered they took from the small towns their only support, to the detriment of the rural sections.

A half mile below the Methodist Church the autoist stopped, alighted and quenched his thirst in the Washington spring beside the road. During the Revolution a skirmish occurred at this spot. The spring, pure and crystal, was transformed into a crimson fount. The fight waged fast and furious, one side gaining, then the other. But a lull appeared, the men retreated, leaving their leaders to battle alone. The duel was long and bloody. It was an even fight, terrible to witness, with a disastrous result to both men. The old inn still stands a few feet away, modest and unpretentious.

Glorious is the ride through the Byram valley to Kensico and along Kensico Lake. There is no more popular trip than this around New York, and the constant hum of the "horseless" only wanes when night hath descended upon the universe.

Toward dark the return was begun, and again grasping the lever, the sturdy car carried its occupant from Westchester's county seat at a steady clip. The road was clear and the speed exhilarating. On and on, until suddenly out of the darkness, came a gruff, excited command.

A wild figure appeared in the searchlight, an uncouth-looking man, whose disheveled hair and clothing bespoke the likeness of an escaped lunatic. The interruption was startling. Something akin to awe crept over the tourist. What next was to develop he knew not, and the existence of the unexpected apparition evidently boded no good.

A question, however, evinced the fact that the individual was a rural editor, who was searching fruitlessly in the darkness for a wallet, containing a thousand dollars and valuable papers. He had been riding along in a wagon when the pocketbook had mysteriously fallen from his pocket.

His search had proved unavailing; he was on the verge of nervous collapse, and the tears started from his eyes.

"Just give me the aid of your searchlight," he said. "Help me find it. Otherwise I shall lose it altogether."

Taking his seat in the machine both men scrutinized every inch of the road for half a mile. Then they came upon the editor's horse, which was tied to a tree. There was yet some distance to explore before giving up. They were now in a village.

A traveling fakir stood by before a large crowd of country people selling his wares. In a jocose manner he was relating stories of gold bricks and greengoods men. The crowd was so dense that they completely covered the roadway, jostling one another good-naturedly and dancing around the outskirts of the party.

As the automobile came along the crowd parted. The strong light blinded them for a moment, but revealed a tattered wallet, trampled and torn beside the road. The editor, with a bound of delight, leaped from the machine, picked the lost article up and examined the contents.

The eyes of the country folk opened wide in astonishment, while the fakir was nonplussed altogether.

A thousand dollars, a veritable fortune, lying beneath their feet without their knowledge! Why, now, many of them recollected kicking the object in the darkness. But a pocketbook full of good money! Well!

The populace went almost wild. All interest in the fakir was abandoned. The village had a sensation, the editor had recovered his money, the fakir was forsaken, the autoist resumed his journey, and the car disappeared amidst the cheers of the crowd.

Only one voice broke the silence later, and upon the night air floated forth from a Silas the ejaculation:

"By gum!"

New Vehicles and Parts

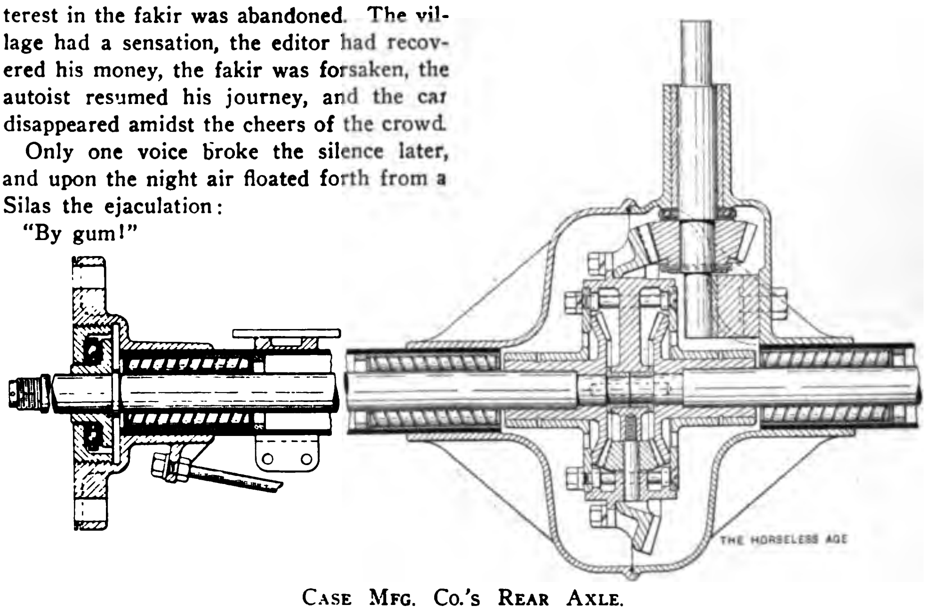
The Case Driving Axle.

The axle here shown is a product of the Case Manufacturing Co., of Columbus, Ohio, which is now giving considerable attention to this branch of the automobile business. It is of the bevel gear drive pattern, with outside casing built up in the conventional manner. The central case, containing the driving gear and differential, is constructed of two thin castings, strongly webbed, and is divided vertically, being held together by bolts which pass through lugs (not shown) attached to each half. The joint between the two parts of this case is so made that the edge of one fits under a lip formed on the other. An annular groove of semi-circular section is turned in each edge, and into these is fitted a circular packing of felt which makes the joint dust and oil tight.

Steel tubes 2¾ inches in diameter extend from this casing to the outside axle fittings, which provide for the use of internal hub brakes. The spring supports are also secured to these tubes. An adjustable tension rod passes under the central case and is secured to webbed lugs formed on the outside fittings.

As has been said, bevel driving gears are used, the thrust from which is taken up, in the case of the pinion gear, by a ball thrust bearing back of this gear and a plain thrust half bearing, located within the case, which supports an extension of the pinion gear shaft. The thrust from the bevel wheel is taken by the roller bearings in which the driving shafts run and by an adjustable ball thrust bearing located in one of the outside axle fittings.

The manner in which this thrust is transmitted to the outer end of the axle is interesting. The spider for the bevel gear differential group is made with six radial



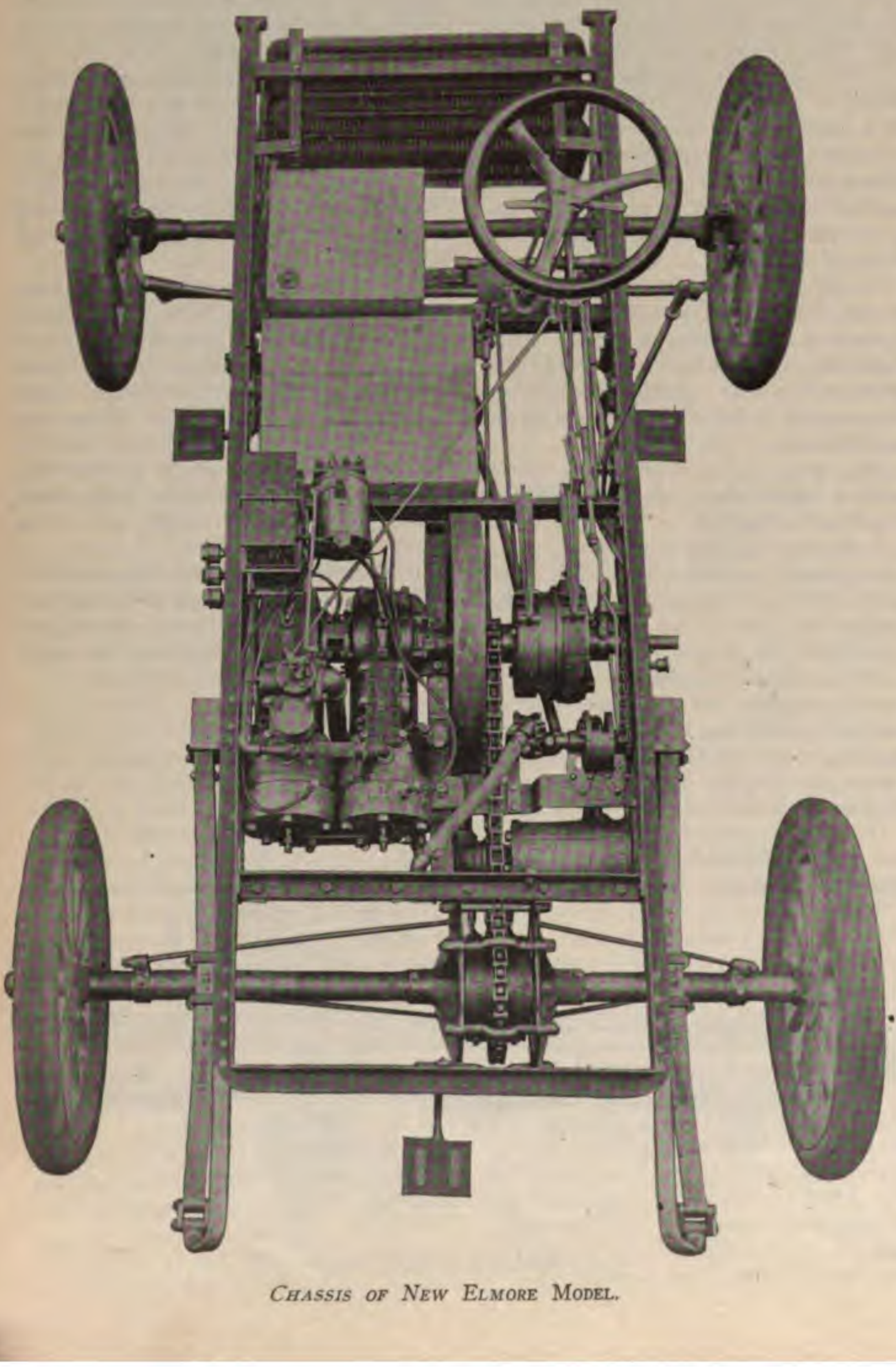
CASE MFG. CO.'S REAR AXLE.

arms, three of which are cut away for a portion of their length to make room for the pinions. The other three carry a circular rim which completely surrounds the differential group and to which is bolted the bevel driving wheel. This spider has its bearing on the abutting ends of the two driving shafts, and fits between shoulders formed on them. It also bears against the central part of the larger bevel gears of the differential group, which in turn fit against other shoulders on the shafts. The outward thrust of the driving gears is, therefore, transmitted through the spider to the shaft, and by it, in turn, by means of a collar formed upon it, to the cone of the ball thrust bearing located in the outer axle fitting. The adjustment of this bearing is made by screwing the cup into or out of the fitting.

The thrust from the large bevel gears of the differential group is taken up by the disks, fitted with long sleeves, which are bolted to the circular rim of the spider, contact with them being made in a circular ring at a point near their outer edges.

The "live" part of the axle revolves in four long roller bearings which are located at the ends of the two casing tubes. Hardened steel bushings are provided between the rollers and the tubes, while the shafts bear directly on the rollers.

The pinion shaft runs in a long bronze bushed bearing formed in an extension of the central case. The bevel pinion is secured to this shaft by a key, and the shaft is prevented from working out of its proper position longitudinally by a shoulder and a cotter pin which passes through both the gear and shaft.



Chassis of New Elmore Model.

A New Elmore Model—Elmore Delivery Wagon.

The Elmore Manufacturing Company have started work on a lot of machines of a new model, the first of which, named the Pathfinder, is now completing its second round trip from New York to St. Louis and back. A plan view of the chassis of the new car is shown herewith, and gives a good idea of the general arrangement of the parts. The vehicle is equipped with a two-cylinder horizontal two-cycle motor of the same dimensions as the single cylinder motor used on the present model of the company, and rated at 16 h.p. The car weighs complete 1,400 lbs.—that is, little more than the former model—and is therefore much more powerful in proportion. While the general layout of the design closely resembles that of the single cylinder machine, some of the parts have been made stronger, including the transmission and the drive chain, the new chain being 1¼ x ½ inches instead of 1 x ⅜ inch. The carburetor is located on top of the engine, and the automatic oiler, which formerly occupied this position, is now located forward and has four feeds instead of two.

Owing to the attention directed to this model by the double trip from New York to St. Louis and back, it has been decided to run through a lot of these machines the present fall. The Pathfinder carried, besides the two occupants, 400 lbs. of baggage, and is claimed to have required no repair parts from the factory during the whole 5,000 miles run. During the second trip it received a general overhauling at the factory. The spark plugs are located in the cylinder wall, where they are fanned by the incoming charge, which tends to keep them clean, and it is claimed that during the first trip no plug was taken out until Philadelphia was reached on the return.

The Elmore Company are also bringing out a delivery wagon, consisting of their model 9 fitted with a delivery body affording a loading space of 30 x 30 x 60 inches inside dimensions. A maximum load of 500 lbs. can be carried. The loading space flor is entirely clear, the water tank being located in front and the gasoline tank under the seat, and can be reached by either removing the footboard or the floor in the rear platform.

Combination Umbrella Basket and Gasoline Tank.

The Rattan Novelty Co., of Springfield, Mass., write us referring to the frequent trouble of participants in the late St. Louis tour from running out of gasoline en route, and state that they have brought out a combination umbrella basket and gasoline tank holding four gallons of gasoline, a supply large enough to carry a car from point to point. It is claimed that as the combined basket and tank is carried at the rear of the tonneau, there is absolutely no danger involved in this extra supply of gasoline.

TOURING ROUTES

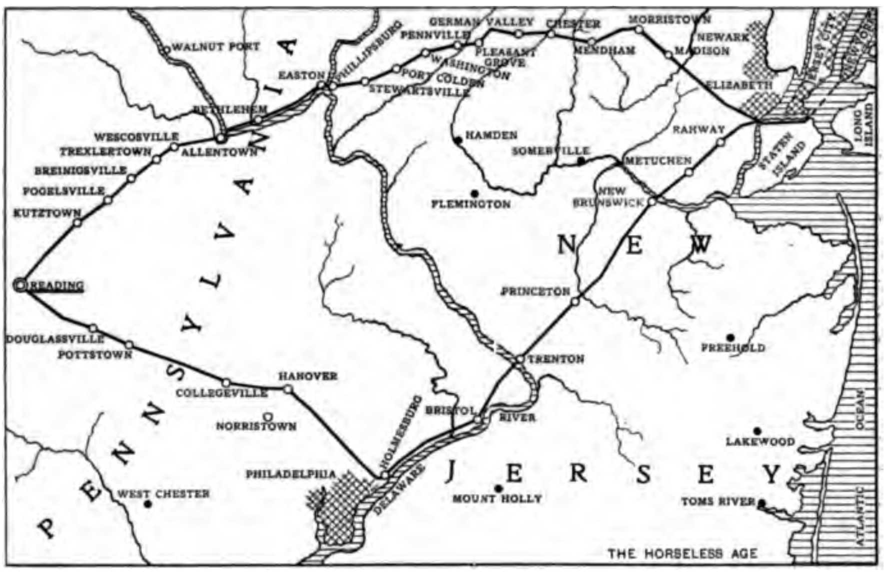
New York to Reading, Pa.

By Charles E. Duryea.

w that the Automobile Club of Ameri- s set the seal of approval on the roads en New York and Gettysburg, it may at this beautiful portion of the world e more favored by tourists, who, in osence of something else to do, have trying to see how fast they can go he level stretches of south and eastern Jersey. Here each bend in the road s a new landscape to view and the ation is to linger on each hill top and the beauty, but down in Jersey, where the road and the scenery are alike iiles, there is not much to think of t the finish. As compared with Jer- oads, those in Pennsylvania are not but some are better than others, ifter a week's trip, covering quite a territory between Atlantic City and ng, we (wife and I) both agree that ke Pennsylvania touring best. This of the State is blessed with good , so that a good meal can be found t anywhere and at less cost than over ver.

: route selected by the club passes gh Reading by way of Philadelphia, : present the best way to reach Read- om New York is by way of Morris- Easton and Allentown. This road is les shorter, has a larger proportion of road, is more level and is not so and rocky as the road toward Phila- a, because, being more level, the dirt ot washed away, leaving the rocks. : is some dirt road which would not od in very muddy weather, but most : year this road may be safely consid- the best of the two.

shington street out of Morristown seven miles to Mendham and five to Chester, making an almost square to the left entering Chester. A tele- line of four cross trees and three insulators runs from Morristown to n, and is followed most of the way, it it serves as a guide at one or two roads, where one might otherwise be ubt. Six miles from Chester is Ger- Valley, where a right turn is made long hill, three miles to Schooley's tain. (Don't turn off at the sign : the wires leave the State road before ing Schooley's. No distance is saved, he road is not so good.) At Schoo- mountain turn left on a dirt road, iiles to Pleasant Grove, then over a crooked, hilly and bad road, three to Pennville, then 3½ to Port Col- ver fair dirt road. Here cross over ilroad tracks to State road, one mile ashington, which is entered under a



tunnel. Pass straight through eight miles to Stewartsville and four to Phillipsburg Some road repairs required a detour at Stewartsville last week, but the road is good either way. Another mile leads to the center of Easton and straight up the hill following the middle one of three car tracks to the end of the brick street, after which turn to the left one block and then to the right toward Bethlehem, following trolley 12 miles. A right hand turn is made entering Bethlehem, following trolley straight through, six miles to Allentown. Pass straight through to suburbs and where trolley turns to right turn left one block. Then turn right and follow main telegraph line and trolley, five miles to Wescosville, three to Trexlertown, two to Breinigsville. After passing this place turn right, leaving the trolley and wires at 'Koch Bros.' 10-mile post and go over one mile to the old State road, which leads from Allentown to Kutztown by way of Fogelsville. Here turn left and follow the wires seven miles to and straight through Kutztown, and 18 to Reading, practically a straight road. From the Staten Island ferry to Reading by this way is about 115 miles, 55 of which is State road, 16 of fair dirt road, good in good weather, two or three hilly and rough, and the remainder old stone road, hard but passable in any weather and generally good.

A second way, avoiding Philadelphia and saving some distance, is to cross the river at Trenton and run down the Bristol pike to Cottman street, where it crosses Frankford avenue, three-fourths of a mile below Holmesburg. Follow Cottman street and Church road along a township line as closely as the hills will permit, through Ogontz, turning right across the creek and to the left, a short way up the Ogontz hill, till White Marsh is reached. Here pass through a toll gate, under a railroad track, and turn left along the Skippack pike to Center square. There turn left two miles to the Germantown pike at Hanover or Penn Square, then turn right, passing straight through Collegeville and Pottstown to Douglassville. Here one may either cross the river to the left or the railroad tracks to the right and follow either parallel for some distance, continuing direct to Reading. In the reverse direction, note that the trolley road to Norristown leaves the Germantown pike on the opposite side of the river from Collegeville, and that Philadelphia may be reached by either way, but that through Norristown is the best. From Norristown toward Philadelphia good roads may be had on either side of the river, being longest but best on the west side through Bryn Mawr, but above Norristown they are both hilly and rough. The distance from Staten Island ferry to Reading via Holmesburg is about 140 miles, of which 61 is stone, 18 sandy and muddy, the balance hard and generally good.

A third route, if the roads are good, is less easily found, but passes through some beautiful country by way of Plainfield, Boundbrook, Somerville, crossing the Delaware river at Lambertville after which it follows the old York pike to Doylestown, thence to Hatfield, Harleysville, Zieglerville, New Hanover, Boyertown and Reading.

A Multiple Cylinder Idea.

We learn that E. H. Perkins, of Warren, Mass., has begun the construction of a novel car for his personal use. It is to have six cylinders, four to be used for driving the car, one for generating electricity for ignition and electric lighting purposes, and one for running an air compressor for use in starting and to operate the air brakes. Our informant does not mention whether the inventor intends to use one-sixth of the power generated by a 6-cylinder motor for generating electricity, one-sixth for compressing air and the remaining two-thirds for driving his car, or whether he is contemplating the use of three separate engines. In the latter case it would seem that his proportions are wrong.

COMMUNICATIONS

A Trip Through Canada.

Editor HORSELESS AGE:

A few days ago a party, including the writer, made a trip from Windsor to Hamilton, Ont.—and let me state right here that a more desirable route for an automobile tour could hardly be found anywhere, the general character of the roads being excellent. There were five in our party, and while we made no attempt at speed whatever (two of the occupants of the car being ladies), the run from Windsor to Hamilton, 223 miles by road, was, nevertheless, covered in 12 hours and 20 minutes, thanks to our reliable car and the good roads of our Canadian cousins. More should be said of these Canadian cousins, and I wish to further interrupt my story right here by paying them a tribute which is certainly due them. I have driven cars considerably about the country, especially in Michigan, and nowhere have I been accorded the same courtesy or observed the same friendly spirit which was ever manifested by the Canadian farmers met en route. They always have the usual salutation, and in meeting or passing them, they always accorded us at least one-half of the road, if not the whole. They were always glad to correctly direct us, if need be, or to chat for a moment if we were so inclined. I particularly recall at this moment stopping at a grain store just outside of Woodstock. I was then rather tired and dusty, having been at the wheel continually for 176 miles, and I asked the gentleman in attendance if I could find a place to wash my face and clear my eyes. My request was promptly granted, but a fine, clean-cut, clear-countenanced and kindly gentleman standing by suggested my crossing over the way to his home where things were more convenient. I was only too glad to accept the proffered hospitality, and after meeting his good wife, one of those types of womanly women whose very presence immediately puts you at ease, it was suggested that I might feel better if I took a bath, and that their bathroom was at my disposal, in fact, at the disposal of any of our party. Our time would not permit this, but a good basin of soft water with a wash-towel, and then some more water to rinse with and an immaculately clean towel to dry, made me feel like a new man. I had always thought of Canadians, or referred to them, in a sort of question-mark style, but there is now a very tender place in my heart for—why not say our Canadian brothers.

But to return to the story. We were bowling along at about fifteen miles per hour on a beautiful stretch, when all of a sudden from the side of the road and just in front of the car jumped three pigs—good-sized shoats that would weigh about 50 lbs. each—immediately in the center of the road, and, of course, it simply meant "killed hog." Well, we ran over one, another slipped through under the machine with a squeal and minus some bristles, but all that was in evidence of the third was the squeal which traveled right along with the car, and we could not make out where it was coming from, but when I had stopped and jumped out to investigate, I found the pig spiked on the starting crank.

Mr. Farmer happened to standing right alongside, and with fear and trembling of the awful damnation that both car and driver were to receive, I awaited the onslaught. "Well, I thought they would slip through under," he quietly remarked. "That one failed, is quite clearly evidenced," I suggested, "but we are quite willing to settle if you will state the pig's worth." "About $4.00, please." This was promptly paid, farewells exchanged and the farmer, with fresh pig to eat, for which he had been paid, was soon lost to sight in the cloud of dust raised in our efforts to quickly flee from the awful scene of carnage and blood.

EDWIN ST. GEORGE.

The Sturtevant Automatically-Variable Gear.

Editor HORSELESS AGE:

I was very much interested in the description of the Sturtevant car which appeared in your issue of August 10, but there were a few things in this description which were not quite clear to me and which I should like to ask about.

What prevents the high-speed clutch from engaging when the reverse is in? Is there not a range of speed between the low speed at its highest and the high speed at its lowest which can never be attained? When the car is climbing a grade a little too steep for the high gear and the low-speed clutch is engaged, will not the engine speed up enough to throw in the high again, thus keeping the high clutch continually slipping or causing a constant change from one clutch to the other?

H. W. H.

[We submitted this communication to the manufacturers of the car whose reply follows.—ED.]

Replying to your correspondent, we are glad of an opportunity to bring out the points of the multiple-plate centrifugal change gear clutches of the Sturtevant car. They have been in use two seasons in a 50-h.p. gasoline launch. They have required no adjustment, show surfaces merely brightened by wear, and we know of no reason why they may not be good indefinitely. This brings us to the question of slip.

These clutches are designed to slip as they engage. The power to grip can be increased to any extent desired by adding a few discs, which have nearly the diameter of the fly-wheel, and their great surfaces running in oil, have ample power and show practically no wear. Grip without slip makes a bad clutch. The discs should slip in starting, that the shocks on the power transmitting mechanisms (gears or chains) may be so lessened as to be harmless. They should slip as the gears change, so that the gear teeth may engage softly. They should slip, also, to produce all ranges of speed not produced by the engine.

By varying the foot pressure on the driving pedal, this car may be caused to move as slowly as the hands of a clock or sped to the full power of the motor.

These are some of the advantages of controlled slip. There are no attending disadvantages, for wear is practically nil, and efficiency is not affected when the car is running on the power gears, or on the direct drive, for in either case there is no slip whatever.

The powerful centrifugal clutch discs occupy so little room in the fly-wheel that one set of rim weights can actuate even three or four sets of speed gears.

We know of no speed whatever, whether "between the low-speed at its highest, and the high speed at its lowest," which cannot be attained. Practically, this car has every speed within the engine's ability to drive. On a grade the car is seen to run from the high to the low or from the low to the high, just as it would be expected to do under perfectly skilful manual control. And the changes are smoothly and silently accomplished. Its hill-climbing power is unusual. It must be remembered that under the conditions named by your correspondent there is always a division of torque between the direct drive and the gear train. The action, on any grade, appears to be perfect, and the ability of the car to climb indicates a high mechanical efficiency not lost under any circumstances observable.

There is nothing to prevent the high-speed clutch from engaging when the reverse is in, in which case it would merely act as a brake to prevent the motor from speeding too fast. The reverse movement is rapid enough for any practical purpose.

T. L. STURTEVANT.

Cause of Popping in Burner.

Editor HORESLESS AGE:

I note the inquiry of John S. Adams in the latest number of the HORSELESS AGE and write to say that his difficulty probably arises from too small a vaporizing coil. Evidently when the fire is burning the kerosene is vaporizing all right, as he says. The blazing up only occurs if the regulator has been shut and then is opened. While the regulator is closed liquid kerosene probably collects somewhere in the pipe outside of the fire and then, when the regulator opens, it runs into the fire in liquid form. Of course, it makes a big blaze, and I have had similar difficulty with my steam car, which burns gasoline. By enlarging the coil I have obviated it. Possibly the same

result may be obtained by opening the main kerosene valve less, so that the quantity flowing through may be more perfectly vaporized, providing enough passes to keep the steam up. I have had no experience with the kerosene burner myself, but I trust that some of these suggestions may be of service to your correspondent.

C. D. Irwin.

Editor Horseless Age:

In reply to the inquiry of J. S. A. regarding the explosion of gases in his Melrose burner, would say that I have had the same experience, and found that it was caused by the pilot light getting clogged and the hot tubes igniting the gases from the main jets when they are turned on, but not before the burner space had been filled by the gas. I do not believe that any ill effects would be occasioned by the light explosion. Great care must be used to keep the pilot jet open, by frequently screwing in the cleaner point. This is an excellent pilot when kept open.

J. S. Anderson.

Broken Valve Head Causes Havoc in Cylinder.

Editor Horseless Age:

As the letters and answers, like the other articles in your magazine, are of value to all motorists, I trust that you will answer in your columns the following query suggested by a recent misfortune that befell my car: The exhaust valves are below the inlet valves, and on the outside of each vertical cylinder the spark plug entering at the side between them. The head of one of these mushroom valves broke off, passed into the cylinder, and the rising piston evidently drove it through the head of the cylinder into the water packet. Was this due to defective material of the valve or does the heat of the burned gas passing the head of the valve, when open, weaken it? My car is less than four months old. How can I prevent the recurrence of such an accident? Ought exhaust valves to be replaced at fixed periods, or can they be tested in any way, or was the accident due to a flaw in the valve? Your description of the Napier car seemed to me to indicate a rather limited life of exhaust valves. If so, what is the practice to avoid such results as I have experienced?

Elmore F. Elmore.

[We do not believe that the accident can be laid to defective material, as when a valve has worked for four months it is a pretty good sign that the material is not of poor quality; it must be ascribed rather to faulty design. In some engines the valve passage is made of such section that the valve head will not pass through it, and where the valve head can get into the cylinder, if broken off, a good "fillet" is left at the junction of the stem and head (where the greatest strain comes) which adds materially to the strength of the valve. To still further increase the structural strength of the valve, the upper end of the stem, above the guide, is made larger in diameter than the other portion. The direct cause of the breaking of the stem may have been either crystallization of the metal from the continual hammering or burning away of the stem underneath the head. An examination of the broken valve should show which was the true cause. If burning was the cause, the valves should be examined periodically and renewed when weakened. We do not know just what shape the valve in question has, but would suggest that when a new valve is made, the diameter of that portion of the stem which is above the guide when the valve is on its seat be made larger than the diameter of the portion in the guide and that a large fillet (rounding) be provided at the junction of the stem with the head, and where the two sections of the stem join.—Ed.]

Collision Ascribed to Glare of Lamp.

Editor Horseless Age:

On Saturday evening last a 24-h. p. Columbia touring car collided with a 24-h. p. Peerless touring car about one and a half miles from New Britain, Conn., on the road to Hartford. The Peerless was bound for Hartford, and the Columbia was returning from the St. Louis tour to Bristol. About 9.15 P. M. I heard a terrific crash, and hastened to the scene of the collision. Upon arriving, I found what looked to be a total wreck — the Peerless lying in the ditch. Finding no one injured, I returned to the Columbia, which stood in the road near the point where the cars had come together. It was a side collision, the first damage done being apparently the smashing of the hub caps. Then, it seemed, the Peerless gear gave away, its forward wheel spokes being caught by the Columbia's rear hub, wrecking the wheel and letting the forward axle down. The car was immediately ditched, the lights and radiator smashed, and the frame and axle bent; the damage is estimated at $500 or more. The Columbia suffered less, breaking only the steering pivot, sleeve arm, fenders and hub caps, and the damage is placed at only about $20. The cause of the accident is claimed to have been the blinding of the Peerless driver by the three searchlights on the Columbia. The accident occurred on a straight, narrow road.

An Eye Witness.

Explosion Engine Query.

Editor Horseless Age:

I have a double opposed motor, and have had to take the crank shaft out. On putting it together again, I found the gears had no marks. Will you please explain how to set the valves? I have had two men look at the motor, but they both had to give it up, saying they did not understand an opposed motor. Will you please explain the principle of an opposed motor?

T. O. H.

[Before taking an engine apart the gears should always be marked, a center punch mark being made on one tooth (at the point of mesh) of one gear and on the two teeth of the other gear in contact with this tooth. In a double opposed cylinder engine the two cylinders work alternately. Set the crank in a horizontal position and so that the two pistons are in the innermost position. Now turn the cam shaft for one cylinder in the normal direction of rotation until the exhaust valve has just begun to rise from its seat. When in this position shift the gears operating this valve sideward into mesh. Next turn the crank through a complete revolution and turn the cam shaft of the second cylinder (also in the regular direction) until the exhaust valve of this cylinder begins to lift. Then shift this pair of gears into mesh. To verify the correctness of the valve setting, ascertain that in each cylinder the spark is produced after three complete strokes from the time the exhaust valve begins to lift when the crank is turned in the direction of running, and that the spark in one cylinder occurs just one revolution of the crank after the spark in the other cylinder.—Ed.]

A New Anti-Friction Copper Alloy.

A new alloy for anti-friction service is mentioned in the *Elektrotechnischer Anzeiger* of Berlin. It consists of copper intersected with particles of graphite. A plate sprinkled with graphite is dipped into a copper bath, when the copper is deposited on the plate and incloses the graphite. The plate is then withdrawn and again treated with graphite, after which it is reinserted in the bath, and the two operations are alternately repeated until the required diameter is reached. It is said that the friction on metal so treated releases the particles of graphite, which then act as a lubricant.

Trade Literature Received.

Electric Vehicle Co., Hartford, Conn.—Catalogue of Columbia electric town carriages.

Welch Motor Car Co., Pontiac, Mich.—Catalogue of the Welch touring car.

Duryea Power Co., Reading, Pa.—"The Duryea Abroad."

Van Husan & Farr Co., Detroit, Mich.—Circular on Snell's Hydraulic Gasoline Storing System.

Brazier Automobile Works, 1811-1815 Fitzwater street, Philadelphia.—Catalogue No. 2 of accessories and repair parts for Oldsmobiles and Cadillacs.

Spon & Chamberlain, 123-125 Liberty street, New York.—List of books on all branches of engineering, electricity, mining, mechanics, trades and industries.

The Lunkenheimer Co., Cincinnati, O.—Catalogue of Lunkenheimer Mechanical Multiple Feed Lubricators for Gasoline Automobiles.

The Cleveland Race Meet.

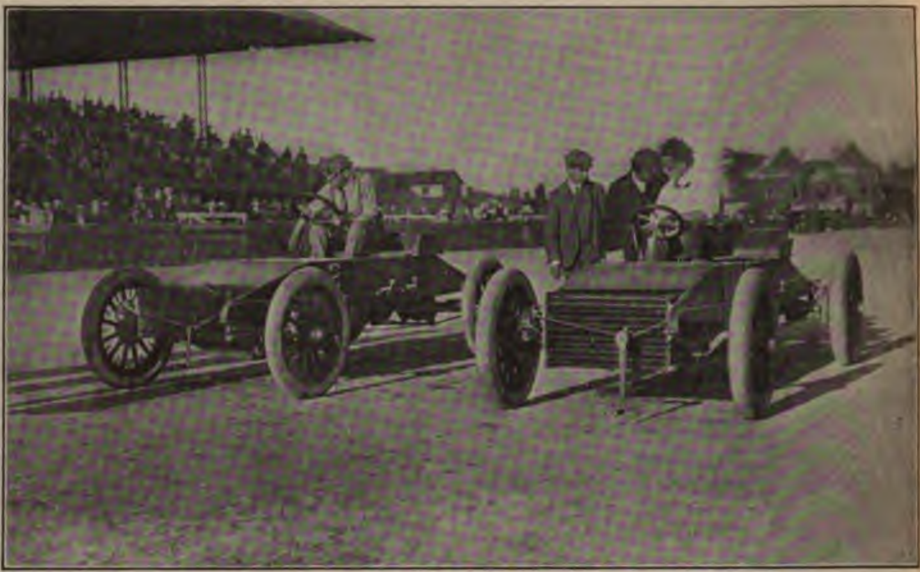
The achievement of Earl Kiser, who drove the Winton Bullet No. 2 one mile in less than 55 seconds three times in succession, and who established a new world's track record for one mile, of 52 4-5 seconds, were, as was set forth in our last issue, the features of the first day of the race meet held by the Cleveland Automobile Club at Glenville Track on August 22 and 23. Climatic and track conditions were as perfect as possible, and these, coupled with the perfect operation of his car, made possible Kiser's exceptional performance.

The first of the day's events was a 100-yard obstacle race. There were four starters, two gasoline and two electric cars. Miss Nina Stevens, driving a Baker electric runabout, completed the distance in 49 4-5 seconds, thereby winning the event from her three male competitors.

George Russel (Cadillac) was the winner of the second event, a two-mile race for stock runabouts. His time of 3m. 43s. for the two miles was remarkably fast for the class. F. Winchester, driving a Franklin, was second in this event.

The race for the Diamond Cup proved to be the most exciting of the day, and furnished a much closer "finish" than is customarily seen in motor car racing. Kiser, who had lost nearly five-eighths of a mile at the start through the stopping of his motor, restarted, and after passing all the other competitors, finished only a wheel's length behind Lyttle, the winner, who drove the eight-cylinder Pope-Toledo.

The fourth event, a five-mile handicap, was won by Soules (Pope-Toledo), who was allowed a handicap of three-quarters of a mile. The Bullet No. 2, starting from scratch, finished last, after Bullet 3 and the eight-cylinder Premier Comet.



THE TWO "BULLETS." KISER, THE CHAMPION, ON THE RIGHT.

The motor cycle race, which was the fifth event on the programme, was won by L. E. Manley, riding a Rambler. He crossed the line one-quarter of a mile in the lead. H. E. Chubbuck and A. B. Hoffman, each riding a Yale, finished second and third, respectively.

Soules and his Pope-Toledo were again winners in the five-mile race for stock touring cars. A. E. Morrison, of Boston, driving a Peerless, was second, and a Pope-Toledo, driven by R. H. Magoon, finished third. The winner's time was 5:51 1-5.

The final event of the afternoon was a special race of five miles for eight-cylinder cars. There were three starters, the Bullet No. 2, the Pope-Toledo and the Comet. They finished in the order named. It was the last mile of this race which was made in 52 4-5 seconds. The accumulative times of the five miles were as follows: 1:04 4-5, 1:58 4-5, 2:55, 3:58 1-5 and 4:51. A summary of the first day's racing was printed last week.

THE "COMET" AFTER THE ACCIDENT.

SECOND DAY.

The second day's racing was marred by what might have been a fatal accident, but fortunately resulted in a smashed racing car only. While running on the backstretch, a rear wheel of the Comet, driven by Carl G. Fischer, collapsed, and the machine ran into the fence at the side of the track. Fischer jumped and escaped injury.

The anticipated record smashing did not materialize, owing to the fact that the Bullet No. 2 went wrong in some way, the eight-cylinder Pope-Toledo was put out by a broken water pipe, and the Premier Comet met with the accident chronicled above.

In the ten-mile open race, Chas. Gorndt, driving the Winton Bullet No. 3, succeeded in reducing the world's record for cars weighing less than 1,800 pounds from 59 4-5 to 58 4-5 seconds, riding six consecutive miles all under the previous world's record. These miles were done in 59 2-5, 58 4-5, 58 4-5, 59, 59 2-5 and 59.

The first race of the afternoon was a one-mile dash in heats. Lyttle (Pope-Toledo) won two heats in succession and thereby took first place. Chas. Gorndt (Winton) was second. R. H. Magoon, of Cleveland (Pope-Toledo), captured the five-mile race for touring cars with road equipment. A. E. Morrison, of Boston, driving a Peerless, was second.

In the ten-mile open handicap E. Messerly, of Cleveland, with a handicap of 2 minutes and 30 seconds, won from George Soules (Pope-Toledo), who yielded him one minute, and Gorndt and the Bullet No. 3, who started two minutes behind him. F. B. Stearns, of Cleveland, driving one of his new four-cylinder cars, finished first in the event for stripped touring cars. Messrs. Messerly and Magoon, both also of Cleve-

land, driving respectively a Royal and a Pope-Toledo, took second and third places. Kiser succeeded in winning the last event, a ten-mile open race, his time being 10:25 2-5. A special race for eight-cylinder cars had been arranged, but as the Pope-Toledo and Comet were both out of the running before the event was called, it was declared off. After the regular programme had been completed a number of the cars tried for various records, but without success.

World's Fair Races.

The races in connection with the World's Fair automobile carnival were held on Sunday, August 28. Originally scheduled for August 21, they had been postponed on account of rain on that day. It is estimated that 25,000 people gathered within the enclosure of the Fair Grounds' race track to witness the events.

In the fifth event, a ten-mile race for the Louisiana Purchase Exposition Trophy, C. A. Webb, Webb Jay, G. P. Dorris and Barney Oldfield lined up for a flying start. Oldfield and Webb were the only drivers to reach the starting line in time, and failing to see the flagman signalling a false start, they dashed around the track together, Webb slightly in the lead. At the three-quarter pole Oldfield tried to pass Webb, but in making the turn Webb's car threw up a cloud of dust which blinded Oldfield, and he, being unable longer to see the track, crashed through the outer fence. His car struck and instantly killed John Scott, a ground's watchman, and so seriously injured Nathan Montgomery, a negro laborer, that he died within a few hours. The car continued on until it struck a tree, threw Oldfield out and got wrecked itself. Oldfield was not seriously injured. The dust raised by the two cars in making the turn had completely shut off a view of the tragedy from the spectators, and its fatal ending was not known to a large part of them until the remainder of the programme had been completed.

Newman's Pope-Toledo After Smashing Through the Fence.

Having been restarted, the race for the Louisiana Purchase Exposition trophy was won by A. C. Webb (Pope-Toledo), in 10:52. This was the principal event of the meet, the trophy being valued at $500. Oldfield did not succeed in breaking any records in the three-mile exhibition, the second event. A summary of the racing follows:

Five Miles, Vehicles Weighing 881 to 1,342 Pounds.—Won by W. F. Winchester (Franklin); G. P. Dorris (St. Louis), second. Time, 6:33½.

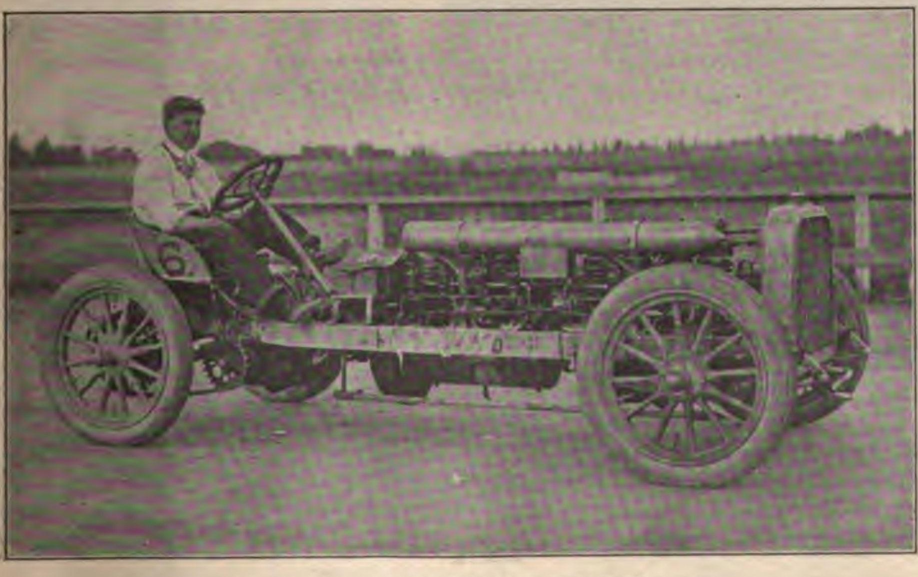
Three-Mile Exhibition.—Won by Barney Oldfield (Peerless). Time, 3:15½.

Five-Mile, Flying Start, Stock Cars Weighing 881 to 1,432 Pounds.—Won by Webb Jay (White); G. B. Dorris (St. Louis), second. Time, 7:16.

Ten Miles, Flying Start, Louisiana Purchase Exposition Trophy, Vehicles Weighing 1,432 to 2,204 Pounds.—Won by A. C. Webb (Pope-Toledo); Webb Jay (White), second. Time, 10:52.

Ten-Mile Lap Race, All Types, Weighing 881 to 1,432 Pounds.—Won by Webb Jay (White); W. W. Leathers (St. Louis), second. Time, 15:12.

Motorcycle Race, Five Miles.—Won by H. Maher; A. L. Jordan, second. Time, 7.26½.



Lyttle on the Eight-Cylinder Pope-Toledo.

Detroit Races.

On the first day of the two days' race meet of the Detroit Automobile Racing Association, at Grosse Pointe track, Aug. 26 and 27, about 5,000 people attended. The feature of the day's racing was the fifteen mile open race, the last event on the programme, which brought together Barney Oldfield, with the Peerless "Green Dragon," and Earl Kiser, with the Winton "Bullet No. 2," for the second time in the afternoon. Oldfield took the lead soon after the start and gradually drew away from the other contestants, Kiser and Chas. Gorndt, the latter driving "Bullet No. 3." At the end of the fourth mile he was more than a quarter of a mile ahead of Kiser. The two leading cars held their relative positions throughout the next five miles. At the beginning of the ninth the Bullet No. 2 began to gain, and at the end of the thirteenth was only about a hundred feet behind the leader. Kiser finally caught up with and passed his rival in the last half of the last mile and won by about twenty lengths.

The 10-h. p. Ford, driven by Kulik, set new figures for one mile for cars weighing under 1,432 pounds. In the first race, which was won by this car, the winner completed one trip around the track in 1:04 4-5.

The race for the Diamond Cup was on the programme as Event No. 3. Oldfield (Peerless), Gorndt (Winton) and Lyttle (Pope-Toledo), reported at the starting line. The race proved to be a runaway affair for Oldfield, who won in 5:00 flat.

Oldfield was again a winner in the five-mile handicap. He started from scratch and yielded three-eighths of a mile to Kulik and the Ford, and one-quarter of a mile to

Gorndt, who finished second and third, respectively. It was in this race that Newman, driving a Pope-Toledo, in endeavoring to pass A. L. Marr in a Buik on the inside at a turn, dashed into the fence and wrecked his car. He fortunately escaped with but few bruises.

After the regular programme had been run off Chas. Schmidt drove the Packard "Gray Wolf" in a ten-mile record trial. He succeeded in establishing a new mark for the distance for cars weighing less than 1,432 pounds. His time was 11:09 3-5.

Following is a summary of the first day's racing:

Five Miles, Open for Cars Under 1,432 Pounds.—Frank Kulik (Ford), first; W. F. Winchester (Franklin), second. Time, 5:40 4-5.

Ten Miles, Open for Stock Cars, Any Weight, Stripped.—George Soules (Pope-Toledo), first; William Newman (Pope Toledo), second. Time, 11:58 4-5.

Five Miles, Open, for Diamond Cup.—Barney Oldfield (Peerless), first; Charles Gorndt (Winton), second. Time, 5:00.

Five Mile, Handicap, Three-fourths Limit, Standing Start.—Barney Oldfield (Peerless), scratch, first; Frank Kulik (Ford), three-eighths mile, second. Time, 5:13 1-5.

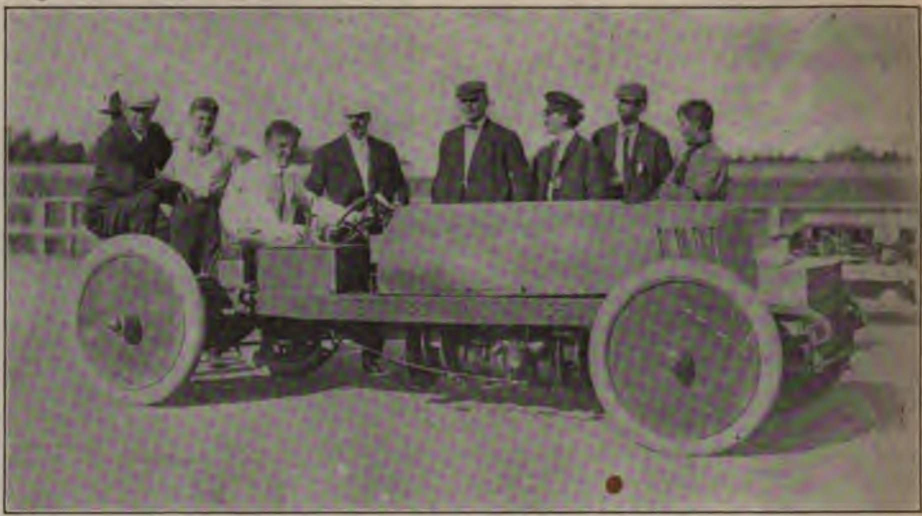
Motorcycle Race.—E. E. Denniston (Auto-Bi), first; J. G. Willett, second. Time, 7:05 3-5.

Fifteen Miles, Open.—Earl Kiser (Winton), first; Barney Oldfield (Peerless), second; Charles Gorndt, third. Time, 14:51 1-5.

Trial for Time.—Charles Schmidt (Packard), finished ten miles in 11:09 3-5.

SECOND DAY.

The opening event of the second day's racing was a five-mile open race for cars weighing under 1,432 pounds. The Franklin, driven by Winchester, and the Cadillac, driven by Al Brush, made an interesting race of it, and it was not until the final mile that Winchester pulled away from his rival and won.



Barney Oldfield on the Green Dragon.

The second event was a handicap race of five miles for touring cars owned in Detroit, to be driven with full touring equipment and four passengers. The Peerless car of E. S. George started from scratch, but soon overhauled and passed all the other starters. The Elmore of J. J. Miller, with a handicap of three-quarters of a mile, was the only one to furnish any competition. For some considerable time after the start it managed to hold the lead. Referee Hoskins was obliged to cut down the field of starters for this event, as a number failed to carry mud-guards or to comply with the conditions in other ways.

The ten-mile open brought out Oldfield, Kiser, Gorndt and Lyttle with the Peerless "Dragon," Bullets No. 2 and No. 3 and the 8-cylinder Pope-Toledo. Oldfield, starting at the pole, jumped in the lead in the first quarter and held it to the finish. His time, 10.04 2/5, was the finest of the day.

The handicapping in the motor bicycle race was based on the performance of the machines in the first race of the day before. L. I. Lutes, on a Mitchell, received the limit of 1 minute and 45 seconds, which proved to be more than he needed, although Willett, on an Auto-Bi, starting from scratch, made a quick race of it, and if the race had been a little longer might have overcome his handicap.

The five-mile handicap was won by Winchester in the Franklin with a start of three-quarters of a mile. The 8-cylinder Pope-Toledo was a scratch in this event and finished second, ahead of Gorndt in the the Bullet No. 3.

The last event of the afternoon was a second ten-mile open race. Through the inability of Oldfield and Kiser to come to the starting line, the only starters were Lyttle and the Pope-Toledo, Gorndt and the Bullet No. 3, and Kulik in the Ford. Lyttle had no trouble in making off with the event. His time was 10.42.

By the end of the last race it was too dark to make record trials, and they were, therefore, omitted. During the afternoon the Ford racer and Packard "Grey Wolf," which was being driven in a record trial, both ran through the fence into the infield, but no one was injured in either case.

A summary of the day's racing follows:

Five-mile Open Race for cars under 1,432 pounds—W. F. Winchester (Frank-

The Monsters Lined up for the 15 Mile Event.

von; Al Brush (Cadillac) second. 7:12 4/5.
oit Owners Handicap, five miles Harry Savage (Peerless) won; J. er (Elmore) second. Time, 7.41.
mile Open—Barney Oldfield (Peer- won; Earl Kiser (Winton) second. 10.04 2/5.
-mile Motor Cycle Handicap—L. I. (Mitchell), 1.45, won; Maurice Can- Orient), .45, second. Time, 7.31 2/5.
-mile Handicap—W. F. Winchester lin), 1/4 mile, won; H. H. Lyttle Toledo), scratch, second. Time,
mile Open—H. H. Lyttle (Pope-) won; Charles Gorndt (Winton) Time, 10.42.

The Omaha Race Meet.

first annual automobile race meet ld at Omaha on August 23 and 24. were ten events on the programme. Oldfield lowered the mile record of mile track twice, first placing the fig- 1.13 3/5 and the next day reducing o 1.12 4/5. The novelty of the meet stop and start race. The competitors bliged to carry a full equipment and gers. The distance was two miles, the end of each half-mile the car otor were stopped, the passengers ed and loaded again and the motor d. H. E. Frederickson won the 6.05 3/5.

. Webb, in a Pope-Toledo, failed in empt to lower the mile record. In a turn a tire was pulled off and he through the fence beside the track. was injured.

attendance on the second day was large as that of the first.

Club Notes.

A. C. A.

club has issued a hand-book con- the automobile laws of all the dif- States which have special legislation subject.

ADO AND COLORADO SPRINGS A. C.

Colorado Automobile Club and the o Springs Automobile Club are g the construction of an auto road enver to Colorado Springs.

DENVER A. C.

members of the club are preparing the proposed city ordinance which for the licensing of all vehicles on d scale according to horse power.

PITTSBURG A. C.

ward of $50 has been offered by the of Governors for the arrest of the who ran into a carriage in Schen- k last week when a child was in- The Board recommends that the liate with the A. A. A.

MARLBORO (MASS.) A. C.

decided at a recent meeting to hold un and basket lunch on September 7. On Labor Day the club members will contribute their cars for public rides about the park. The amount of the fares collected will be contributed to the hospital fund.

A. C. OF SOUTHERN CALIFORNIA.

The assertions of outsiders that its members were not complying with the city ordinance regulating the speed of cars in the streets have caused the club to pass at a recent meeting a resolution, part of which is here given:

"Resolved, That on and after the publi- cation of this resolution this club will commence an active campaign against any and all persons abusing the privileges accorded automobile owners or users by virtue of said ordinance, and all persons, whether they are members of this club or not, found guilty of violating the same will be arrested, prosecuted and punished to the full extent of the law."

CHICAGO A. C.

A club run to Grand Rapids, Mich., is planned for Sept. 9th. While there the members will be the guests of the Grand Rapids A. C., and they will remain over Saturday and Sunday, the 11th and 12th. A parade of decorated cars is also planned for some not distant date.

A. C. OF BRIDGEPORT, CONN.

It is proposed to hold a club clam bake at the grounds of George E. Winton, on the Housatonic River, August 31st. At a recent meeting of the Board of Governors the resignation of Dr. D. M. Beebe as secretary was presented. The Doctor was forced to relinquish the position on account of pressure of professional duties. Dr. D. M. Trecartin is his successor.

CHICAGO M. C. C.

The club will hold a run to Waukesha, Oconomowoc and Lake Geneva on Sunday and Monday, September 4th and 5th. They will go by boat to Milwaukee and make the run on their motor cycles through Waukesha County on Sunday afternoon, and on Monday, Labor Day, a trip from Waukesha to Lake Geneva will be made. The return from Milwaukee will be again by boat.

BERKSHIRE A. C.

At a meeting, on August 23, it was arranged to hold an automobile field day in Pittsfield on September 10th. The programme for the day includes a parade, race-meet and a clambake. Louis A. Merchant, John Noble, George Clark, Dr. C. H. Richardson and Daniel England were appointed a committee of arrangements. Dr. O. S. Roberts and Floyd Knight have been added to the club's committee on tours.

EAST ST. LOUIS A. C.

On Aug. 22 the East St. Louis Auto Club was organized. Henry D. Sexton was elected president; I. C. Elston, vice-president, and Charles O. Clark, secretary and treasurer. Arrangements will be made for the establishment of a club garage.

Haynes-Apperson Car at St. Louis.

We show herewith a photograph of the Haynes-Apperson car, driven by C. H. Birchwood, which was taken immediately after the arrival of the car in St. Louis with the World's Fair tourists. The marks of the last day's run through deep mud are plainly visible and the chain anti-skidding devices attached to the rear tires are further evidence of the hard going during the last stage of the long journey.

THE HAYNES-APPERSON CAR IN THE ST. LOUIS TOUR.

OUR FOREIGN EXCHANGES

The Motorhood.*

Following on that hybrid, "automobile," there can be no harm in coining another word to denote that community which is bound together by the all-absorbing interest in motoring, and for this I would suggest the word "motorhood." The members of this motorhood are closely drawn together on the one subject, which is to them engrossing. They learn from each other, and teach each other. They never let a car pass without interesting themselves in its make and its behavior. Without any formality, they are firmly knitted together in an interest that amounts, in this case, to a positive passion, hardly reached by any brotherhood that exists. Mutual help, anywhere and at any moment, is an unwritten law in the articles of this naturally-formed association. No member wishes to keep the newest and best thing to himself. His first interest is to make it known, and get it shared by the motorhood. Every member is desirous of warning the motorhood of events that proved unpleasant or dangerous to him; of giving full information when and where advantages are to be met with; and so on. The motor car has come to stay, and the motorhood must necessarily increase in its vitality. For the time being, at least, society will have to put up with the conversation of motorists at the fashionable dinner table, as they care to talk of little else but of this passion. As they are in the minority, their topic has something of the so-called "red-rag"—the same phase that irritated society so much twenty years ago, when Wagner's music was so hotly discussed, for and against. That was a dangerous subject in those days; but I doubt if it aroused more vehement opposition, more illogical hatred, or intemperate language, than the subject of motoring does in the present day. Naturally, there is a serious difference between the two problems. The one, when badly or wickedly handled, jeopardizes life; the other stopped at "temper." Still, they are akin, inasmuch as the one was music of the future, and the other is locomotion of the future. But the one means art, and the other means science.

THE SCIENTIFIC ASPECT.

In science, which is for ever, man's last word will be said. In art there is little, if anything, more to be said. In science everything has yet to be said, but it has not been long enough with us in its full activity to affect people sensibly who, sentimentally, prefer what has been customary in the past. A book, lately published, giving 6,000 years of pioneer work in the exact sciences, shows how little, so far, has been done in science compared to what has been accomplished in art, architecture, literature, and music. But now the trend is all in the direction of science, yet in spite of this I believe the fundamental cause for the opposition to motor cars lies in an innate hatred of all mechanical devices. The love of the horse cannot come into the foremost place as a cause. As far as the horse is concerned, nobody is pressed or forced to give up horses. But it is too absurd that anybody should be concerned about the future of this animal. If he is not wanted, he will not be born; he will not be brought into the world to starve, or be more ill-treated than he is now. No; there is in England, more than anywhere else, a strong dislike of mechanism. My reverend old friend John Ruskin, would never come to see me because he knew I had an extensive plant of wood-working machinery that I had set up to save the artist's hand while building my house at Bushey. To such minds, and kindred smaller minds, machinery is something inhuman. But why inhuman? I would say that every mechanical device is subject to man's mood and will and becomes almost humanized. How is it that one driver will get more working power out of a locomotive than another, and without addition or changes in the machine? A motor car will one day respond to the driver better than another day. Is not a violin, or still more so a pianoforte, a mechanical device? Yet both are made expressions of human minds.

MUSIC IN THE MOTOR'S HUM.

Folk who have not motored can hardly realize how a car can become a part of oneself—an expression of oneself. It speaks to you; you hear in a moment if there is trouble; you can detect by your ear the spot that is giving out the wrong note. I took an elderly musician out in my car one day for his first ride. "Delightful, delightful!" he shouted; why, it is musical; hear that diminished third—fine!" That is the "hum" which gives one the comfortable confidence of all going right. Louder and higher is the hum of this diminished third as the car increases in speed, until it almost screams. Once we traveled against a terrific headwind, which made so much noise that the hum was outdone and silenced; although the car was going splendidly, both the driver and I were miserable, as we could not hear the voice of our friend. My new car, of 28 h.p., will necessitate a new musical education—as it is almost silent: but there *is* the voice, and we must learn its speech. Is all this inhuman?

THE AUTO IN LITERATURE.

Many names have been given to this wonderful innovation, "that dates but from yesterday." I will not quote the offensive ones, heard even in Parliament; but Maeterlinck has hit off a happy term, the "hippogriff." In Bavaria a delightful name has been given to it—a name that carries in its meaning affection: "Schnaurferl." There is no translating this dialect-word; "snorter," "hardbreather," are but raw and unfeeling translations. A car that carries you well over thousands of miles, giving you health, joy, and new interest in things around you, can become as much a loved object as a ship. This "wonderful beast" is half human, and becomes strangely a part of oneself. No writer has yet so well described this aspect as Maeterlinck. "I know," he says in his book, "The Double Garden," "its infallible wheelwork. . . . I have had its heart and soul laid bare. . . . Its soul is the electric spark, which, seven or eight hundred times to the minute, sends fiery breath through the veins. And the terrible, complex heart is composed of the carburetor, which prepares, proportions, and volatilizes the gasoline. . . . The mixture is eagerly swallowed by the mighty viscera close by, which contain the explosion chamber, the piston, all the live force of the motor. . . . Next comes the trembler blade which governs the spark, and is in its turn controlled by the movement of the motor. The soul obeys what is properly the body, and the body, in most ingenious harmony, obeys the soul."

MASTERY OF MIND OVER MATTER.

You have to do in this case with a creature hitherto unknown—yet born of man's brain. The mastery over it puts man vastly higher up in the scale of civilization than the mere act of subjugation of the animal, as pre-historic man, after all, succeeded in that perfectly. But it will take some generations before man's brain can adjust itself to the idea of a vehicle passing along the road swiftly without any visible signs of propulsion. An animal or something in front that pulls the vehicle—that has been the hereditary principle that every babe, as soon as its brain could take in objects, has been trained to imbibe since the beginning of known life. But the new generation will soon get used to the new order of things. As Richard Strauss said to me of his daring discords, "The ear soon gets accustomed to these new sounds." Hearing, seeing and thinking—all have to be readjusted for motor-cars. This does not mean deterioration through a longing for over-excitement. Repose of mind is not brought about by monotonous, dull surroundings; that condition is more likely to cause premature decay than most of our modern excitements. But the question of safe excitement is, and always will be, an individual matter. For instance, we speak with uplifted eyes of the plethora of literature that is, in the present day, thrown in our way. But one only takes in as much as one wants! Life can be as simple as one likes still; but foolish and ungrateful is the man or woman who shuts himself or herself deliberately off from the good and legitimately-pleasurable things that are offered in our day.

*By Professor Hubert von Herkomer in the London *Globe*.

CONSERVATISM.

Conservatism must be understood to be an innate quality of the brain. The countries in which this facility is mostly developed will always oppose "the new," be it anything from General Booth's methods for making respectable citizens of the fallen, to Whistler's methods of expressing himself in art. Countries that possess a large leisured class, such as England, will necessarily be largely conservative. Neither America, nor any European country, has so opposed the innovation of the motor as England. From the point of view of conservatism, this opposition has its interest and may have its use.

Now, the real weak point in the present state of motoring is not to be found in the car, but in the present supply of drivers. You see mere boys driving—boys who can have had no training or experience. This newly-evolved race of chauffeurs is altogether a study and a puzzle. Where do they hail from? I have never had a satisfactory answer to this question. As a painter, their faces express to me a considerable amount of insolence and conceit (in the main, of course, as there must always be exceptions). A motor-maker said to me the other day that they were "improving," as only a couple of years ago it was as much as such men would do to sit at the wheel and drive for £5 a week, and they could hardly be persuaded to renew a tire! The present law insists on a license, but does not insist on any qualification for which this serious license is granted; anybody, blind or lame, can get it! Until the same rigid care is bestowed on the training of the motor car driver as it is on that of the locomotive driver, who has to pass through many stages of training, the motorhood will be subjected to the greatest inconvenience, distress, anxiety—and even chances of fatalities! Makers are shortsighted in allowing this state of things to go on.

QUALIFICATIONS OF DRIVERS.

There is no disputing the fact that for the successful use of the motor car you must have a driver possessed of three qualifications; firstly, he must be a trained mechanic—having served his time to engineering, and not merely pottered about a workshop for a month or two—and that is the scientific part; secondly, he must have the gift of driving, which is an art; thirdly, he must have character. Not one of these three qualifications can be safely dispensed with. It is an unusually responsible position. Ninety-nine out of a hundred disasters happen from the lack of one or the other of these qualities in the driver.

It cannot be too seriously placed before the motorhood that the separation of the driver from the trained mechanic is likely, sooner or later, to end in disaster or unnecessary expense. It is not in the garage that the motor goes wrong, but something may, and often does, happen miles away from home. Your mere driver is helpless; unless the driver is a trained mechanic and can remedy a defect on the road, you may be landed in the greatest discomfort for a very slight cause. A short-sighted economy entices motorists to employ the nonmechanic driver. They employ the cheaper boy-driver, who—with but few exceptions—is only ambitious to be "smart"; to show how cleverly he can dash in and out of traffic; how quickly he can turn a corner; and how suddenly he can come to a full stop. I say it advisedly, that such tricks can, and often do, amount to criminality.

I read in a story of American ranch life the following sentence: "If there's anything a young man likes—a good, hearty boy—it's to see a brisk play pushed home." There's your youngest modern motor car driver drawn to the life; and the adventure, indifference to danger, the "brisk play" of ranch life, has found its parallel in motor driving. But, I ask, how would a gentleman like a boy of sixteen (or less) to "push home a brisk play" with a pair of his valuable horse? Yet this gentleman will engage a youth who has merely a smart appearance, and knows enough of the technicalities to throw dust in his eyes—who, though he understands his horses, is quite ignorant of mechanics—and so risks life itself. No doubt the motor industry has come upon us too suddenly, and all the attention has been given to the car. It has made such unprecedented strides that all the accompanying adjuncts for its successful working are not adequately forthcoming. Then, I must say, the man who is suddenly bitten with the craze for motoring only thinks of getting a car quickly, of getting a driver at the shortest notice, and of being off! Then come the unpleasant surprises, break-downs (if nothing more serious), with the result that the whole principle of motoring is condemned as dangerous and uncertain.

A WORD ON ACCIDENTS.

Let it be clearly understood that of the accidents which happen we never get the full explanations, so that the public should guard against jumping at conclusions when a short paragraph with a "scare heading" catches the eye in a newspaper. It goes without saying that accidents absolutely unavoidable will, and always must, happen in every form of locomotion. But the numerous accidents we hear of at present to motor cars do not bear on the real safety or danger of motoring any more than the number of fatal accidents to pedestrians who have simply slipped on a piece of orange peel bears on the safety or danger of walking.

THE ADVANTAGES OF A CAR.

I am not surprised that physicians are now recommending the motor car as a tonic to nerve, blood and brain. I have practically tested motoring now for fourteen months, in which time I have covered some twelve thousand miles, and that with one machine. Physically it has vitalized me; mentally it has stimulated my artistic eye. Those twelve thousand miles on the high roads of England and Bavaria constitute a kaleidoscope of images that positively amount to an apotheosis of nature. Judgment is quickened by the rapid succession of pictures in nature. In those fourteen months I have seen more of nature than was placed before me during my whole life put together! No ordinary speed of the touring car is too rapid for the artist's eye to take in objects around him. Even in Bavaria, where there is no speed limit, and where, on straight, safe roads, we let the machine do its best, I practically missed nothing. And there are endless moments when reflection can take the place of physical perception yet without a cessation of the exhilarating effect of passing through the air swiftly—of oxygen being driven into you. Nothing can take the place of this peculiar factor in our existence. But you must be able to trust your driver and your machine. If you cannot "sit loose," so to speak, your ride is a nervous strain, not worth the agony!

During this season I have gone daily up and down to London by car instead of by train. The road has become a thing of interest instead of a matter of boredom. No need to engross yourself in a newspaper to counteract the weariness of a railway journey! No matter how hot the weather is you start work refreshed; you return after it refreshed, having had the strain of work effaced by this method of receiving fresh air. There is not the lassitude and languor so distressingly attached to a railway journey after a day's labor. If you are prepared to meet all emergencies, and have a mechanic-driver who is forever overhauling, in spare time, the good car, you can practically always keep your engagements. Such has been my experience.

The Duties of a Club Engineer.

The Automobile Club of Great Britain and Ireland employs a "club engineer," and the following from the club's *Journal* will give an idea of the duties he has to attend to:

On arriving at his office in the Motor House, the club engineer finds himself confronted with an ample pile of correspondence. There are possibly two or three letters from members asking him to go down into the country and inspect their cars; and he has to arrange his appointments with them so as to lose no time going over the same ground, but to go across country whenever by doing so he can get two appointments in in the same morning or afternoon, or if they are further away, in the same day.

By the time he has solved this problem or problems there are two or three mem-

bers waiting in the motor-house with their cars to be looked over, and he sets to work to deal with them. The inspection may take one hour, or it may take two. As soon as it is over, he interviews the half-dozen applicants for the post of driver who have been impatiently waiting for two or three hours for him to give them his attention. From these he selects such as an oral examination shows to be likely to be able to discharge satisfactorily a driver's duties—they average four a day—and sets them down to fill up the forms which are in the nature of a searching examination paper, a task which takes them two hours a man. The looking over these helps to fill up his spare time—not that he has much spare time. There are, roughly, eighty-five questions in each of these papers to be looked carefully through; and as some of the applicants come from France, Germany, Italy, Switzerland, and the remoter towns of Spain, it is not so easy—owing to their well-meant but eccentric efforts to deal with the English language—to look over their answers as it may seem.

During the last month he has sent out no less than sixty drivers to different members of the club. For this service members, at present, pay no fee. He has never found any strained effort on the part of a member to thank him for a good driver; but this is more than made up to him by the speed with which members make haste to draw his attention to the faults of a bad one. Again, it never occurs to a driver who by his instrumentality has obtained a post to write and inform him of the fact, although he is always instructed to do so. In his ignorance of the driver's success, the club engineer may write twenty letters bidding him call on other members with a view to a post, but he will take no notice of any of them. On the other hand, each of the twenty members very naturally informs the club engineer of the driver's neglect to keep the appointments.

Another matter which fills up spare time is the matter of accounts. For most mathematical operations quiet is fondly believed to be a necessity. In the course of making out an account—and these accounts often run to two or three pages—the club engineer is wont to be interrupted by two or three members coming to consult him on various matters; by two or three applicants for the post of driver coming to consult him on points of their examination; and by two or three other applicants for the post of driver coming to consult him as to why they have failed to pass their examination. The day is not far off when he will have acquired a really remarkable facility in doing accounts under difficulties.

Then comes his most important function, the main part of the day's work. To take one day last week—a typical day—he examined a 16-h. p. car in New Burlington street, hurried from there to Earl's Court to examine another 16-h. p. car, drove in haste to Oxford street to examine another 16-h. p. car, and then drove a 15-h. p. to the hills of Hampstead to test its hill-climbing qualities. Then he returned to examine a small car in the Club Motor-house, recommended its being sent to the works for repairs, and gave directions as to what those repairs should be. That done, he wrote four full reports on the examined cars, complete in every detail.

It must be borne in mind that it takes at least an hour to inspect a car properly, and, as a rule, it takes longer. Often, too, it happens that the cars are in the country, and he is used to journeys ranging from 20 to 200 miles to inspect them. Often he is invited to examine a car with a view to giving evidence in court as to its condition. But this work he does not undertake.

He is of great service to members also in preserving them from the machinations of the ingenious tradesman who has faked up a worn-out car to look fairly new, and is trying to sell it as a good second-hand one. He is very useful, too, in advising members as to the amount they ought to pay for a car, and again in advising them on extravagant charges in bills for work done without having previously consulted him.

He always finds members exceedingly grateful to him for any services of this kind he may have been able to render them, but he also finds many of them under the erroneous impression that he receives a commission from manufacturers for cars which they sell to members on his recommendation. This is a very wrong impression indeed. Many car-inspecting engineers do take commission from manufacturers when a car is bought on their recommendation, and it is alleged that the greater the commission the manufacturer gives the more cars he sells. But the club engineer takes no commission, and one well-known firm very sensibly allows no one but him to inspect cars for possible purchasers.

To sum up, members can get from the club engineer unbiased, disinterested technical advice as to (1) *Buying;* (2) *repairing;* (3) *keeping in order* a car. It is, moreover, technical advice from a practical engineer, as Mr. Hudlass went through the shops and afterward became manager of his father's firm of Hudlass & Co., builders of steam engines and afterward of motor cars.

The necessary alterations to the "Olympia" building in London to make it suitable for an exhibition building are being rapidly proceeded with in order to ensure its readiness for the motor manufacturers' and traders' show, which is to be held there in February next from the 10th to the 18th. The total space available amounts to rather over 100,000 square feet, and of this some 70,000 square feet have already been taken up by about 100 firms. The ballot was resorted to in order to determine the order in which the various firms interested should be allowed to choose their position.

Wannsee, a town near Berlin, Germany, is reported to have built a new courthouse out of fines levied on automobilists of the capital arrested for speeding.

Statistics compiled by a French contemporary, show that in spite of all the outcry on the part of horse owners and breeders as to the amount of injury which is being inflicted by the automobile industry upon the horse industry, the figures of the horse trade in France for the first six months of 1903 and 1904 are practically identical.

Mr. Gordon Bennett gave a cup for the well-known mad rush of motor cars which takes place every year. It seems that now, through the Paris edition of his paper, the New York *Herald,* he is waging a furious war against scorching. The formation is proposed of a league for the protection of the public, and the New York *Herald* offers to head the list of subscribers with a sum of $2,000.

The A. C. G. B. I., in a circular letter, directs the attention of the public to the worthlessness of records of non-stop runs which are not officially certified. The club has a stringent code of rules for properly carrying out such trials, important among which are the safeguards which have been provided for the protection of the public, and it is formulating further regulations to prevent irregular trials by unauthorized persons in the future.

The six routes for the British reliability trials of light cars in the neighborhood of Hereford have now been fixed, each of the six routes having Hereford as a starting and finishing point will be covered twice each day, making the mileage approximately 100 miles a day. Each route must be covered without a stop, and the car in each class which makes the most non-stop runs will secure the award. If two or more cars are equal in this respect, the one that makes the fastest time up the hills will secure the prize. There will be a hill-climbing contest on each of the first three days of the trials.

A British court has just decided an ordinary life insurance policy does not cover the risks of automobile racing. The Equitable Life Insurance Society had insured the life of Claude Lorraine Barrow, of Biarritz, who was killed in last year's race between Paris and Bordeaux. The insurance company, as is very general, had reinsured Mr. Barrow with the General Accident Assurance Company, and now sued them for the amount. The defence made by the General Accident Company was that it had not been disclosed to them that Mr. Barrow was engaged in such a risky occupation, and it was upheld by the court.

MINOR MENTION

An automobile club has been organized at Warsaw, N. Y.

Baltimore enthusiasts are to hold a race meet on Labor Day.

Tonawanda, N. Y., is to be the scene of a race meet on Labor Day.

The Brooklyn (N. Y.) Automobile Co. has taken the agency for the Yale cars.

One hundred and ten automobile licenses have been issued in Kansas City.

A race meet is to be held at Empire City track, Yonkers, N. Y., on Sept. 24.

It is understood that the new car to be made by the R. E. Olds Co. will be called the "Reo."

Agents of the E. R. Thomas Motor Co. were entertained in Buffalo on Aug. 12-14 by President Thomas.

J. A. Ellis and A. G. Schmidt, of Chicago, recently broke the road record from Chicago to New York.

Automobile street parades will be held soon in Terre Haute, Ind.; Washington, D. C., and Syracuse, N. Y.

The Detroit Auto Vehicle Co. has been organized in Detroit, and it is rumored they will manufacture a convertible runabout and delivery wagon.

The Vanderbeek Tool Co., Hartford, Conn., have brought out an automobile pocket screw-driver with a variety of points designed to fit any size of screw.

E. J. Stoddard, of Detroit, contributor to our columns, has been appointed a member of the jury in the transportation section of the Louisiana Purchase Exposition.

Three American cars have been entered for the Light Cars Reliability Trial in England, viz., an Oldsmobile runabout, an Oldsmobile tonneau, and a Cadillac.

C. W. Brett, of London, informs us that he has resigned as assistant secretary and manager to Messrs. Werner Motors, Ltd., and that he has joined Messrs. Minerva Motors Ltd.

Eugene Bliss, of France, who is engaged in the manufacture of gears of various descriptions for the automobile trade, is in this country for the purpose of buying gear-cutting machinery.

The officials of the Chicago A. C. recently gave the city authorities a demonstration of the control of motor cars and endeavored to persuade them that 10 miles per hour is an unreasonably low limit.

R. C. Burroughs, of the Fauber Mfg. Co., died in Chicago on Aug. 23, as the result of injuries received when the car he was driving plunged into the river over the edge of an open drawbridge.

A number of Chicago automobilists have adopted a plan of taking out for a ride those boys who are inclined to throw stones at cars. The boys' friendship is secured and the stone throwing stops.

The Worcester Pressed Steel Co., with a capitalization of $50,000, has been organized in Worcester, Mass., and will devote a portion of its attention to the manufacture of pressed steel frames for automobiles.

Magistrate Breen, of New York City, thinks that operators of automobiles should be called "motormen" or "drivers," as, he says, the high sounding title of "chauffeur" is responsible for their "supercilious conduct" toward other users of the roads.

The City Solicitor of Wilmington, Del., is stated to be of the opinion that the action of the Common Council is necessary in order to make effctive the regulations of the street and sewer department in regard to the control of motor cars on the city streets.

In view of the fatal accident at St. Louis, which was due to dust-clouds raised by one car obscuring the view of the driver of the car following, the committee in charge of the Vanderbilt Cup race are considering the advisability of oiling the roads of the course at turns and railroad crossings.

Judge Baker, of Newport, R. I., recently sentenced Michael Woods, a chauffeur, to five days in jail for exceeding the legal limit of speed for motor cars. It was Woods' second offense. The treatment of automobile cases by the Newport authorities is gradually increasing in severity.

Martin Maloney, of Philadelphia, and the Electric Vehicle Co., are joint defendants in a second suit brought by Richard Siegman, a stockholder in the company, who charges that $704,800 in dividends was paid out of the capital stock and not from the surplus or net profits, as there were none.

Dale D. Butter, of Middletown, Conn., while driving his car recently at night, was so blinded by the glare of the headlight of an approaching car that he failed to turn out sufficiently in attempting to pass. One of the steering wheels of his car collapsed when it came in collision with a wheel of the other car.

It is said that the lowest insurance rates ever granted on an automobile factory were obtained for the new Ford plant in Detroit. This is undoubtedly due to the fact that the building is equipped with two exceptionally large water tanks, a complete system of automatic sprinklers, three fireproof walls 24 inches thick and double self-closing doors in each partition.

The Nashville Automobile Association was recently organized in Nashville, Tenn. Officers were elected as follows: Geo. M. Ingram, president; Dr. Charles Brower, vice-president; J. C. Symmes, temporary secretary and treasurer; Leland Hume, Thomas J. Tyne, Dr. Chas. Brower, E. C. Andrews, John Chester, John T. Landes and George M. Ingram, directors.

The New York Fire Department has purchased a Columbia 35-h. p. gasoline car for the use of Chief Croker. The vehicle is a regular stock model with the exception that in place of the forward tonneau seats there is a large box for the reception of coats and other trappings which the Chief is liable to need in the course of his rounds. The car was shipped from the factory last Monday.

According to the New York *Sun*, the oyster and asparagus crops of Suffolk County, L. I., are likely to suffer as a result of the reward systems in vogue in that locality for catching automobile scorchers. The County Supervisors have been petitioned to establish a uniformed force of motor catchers who shall be paid regular salaries, and do away with the reward system, which has resulted in extended graft and a disregard for regularity in court proceedings.

Commercial Vehicle Notes.

An automobile line is proposed for freight and passenger transportation between Ortonville and Clarkston, Mich.

The first of the automobile buses which are to run between Rochester and East Rochester has been delivered and was immediately put into operation.

D. J. May and H. W. Wells, Michigan avenue and Abbott street, Detroit, Mich., have recently started an automobile livery service with four Wayne tonneau cars, in connection with their commission and repair business. The cars carry each four passengers besides the driver, and the rate charged is $4 for the first hour and $3 per hour thereafter. The station is advantageously located, only one block from the Hotel Cadillac, and has thus far enjoyed good patronage.

The Military-Technical Committee of the Austrian-Hungarian army contemplates the installation of motor mail lines in the occupied territory of Bosnia and Herzegovina. In these countries there are almost no railroads, and the mail service is consequently very slow and defective. The vehicle which the army authorities contemplate using will be built to carry 1,300 to 1,500 pounds of letters and parcels, and four to five passengers. The parcels will be carried on the roof of the wagon, where they will be protected by a waterproof leather cover. The wagon must be capable of taking grades up to 15 per cent., and be fitted with solid rubber tires, while, as fuel, gasoline and alcohol are available.

LEGISLATIVE AND LEGAL.

The Anti-Speeding Crusade on Long Island.

Police Justice Tyson, of Lawrence, L. I., has met with a setback in his crusade against automobilists in general and scorchers in particular. Lewis B. Sharp, of Far Rockaway, who was recently up before him on a charge of fast driving, has, with the aid of the A. C. A., succeeded in bringing the question of Justice Tyson's eligibility to office before the Attorney General at Albany. Judge Dickey, of the Supreme Court of Brooklyn, was applied to for a writ to prohibit Tyson from proceeding with the trial of Mr. Sharp. Mr. Sharp's attorney argued that Tyson had been a resident of Lawrence only since July last, that he was appointed seven days later, and that as the statutes require that a person must have been a resident of the county for four months and of the election district for thirty days before he he can vote or hold office, he is not eligible, and his appointment is null and void. The Judge reserved decision to await the opinion of the Attorney General.

On Aug. 25 the village trustees of Lawrence, with a view to avoiding further trouble with automobilists, passed a resolution raising the speed limit from 10 to 18 miles per hour. Deputy sheriffs and other officers have been ordered to make no more arrests unless accurate time has been taken over a surveyed course one quarter of a mile in length. As a result of Tyson's crusade several deputy sheriffs are now being prosecuted for felonious assault, many damaged suits threatened, and automobilists now have a greater freedom than ever before.

Justice Tyson is the man who established the telephone system used by the deputies of the district, and it was in his "raids" that many automobilists were threatened with revolvers.

A petition to declare the Bonton Automobile Co., having a plant in Lynn, Mass., bankrupts, was recently dismissed by Judge Hale, in the United States District Court.

At a meeting of the creditors of the Lackawanna Motor Co., of Buffalo, held Aug. 22, thirty-three claims were allowed. W. C. Carroll was appointed trustee under $10,000 bond. The disposition of the property will be decided at a meeting to be held soon.

Judge Baker, of Newport, R. I., on August 30, sent to jail for five days William Yates, chauffeur for Peter D. Martin, who pleaded guilty to the charge of speeding his automobile in Bellevue avenue, Newport, faster than the law allows, colliding with a cab, and throwing out and severely injuring Mrs. Martin's maid.

C. A. Turner, of Cleveland, has brought suit against the Pope Motor Car Co. and the Baker Motor Vehicle Co. for $15,000 damages for injuries which he received at Glenville track during the automobile race meet last year. He says that cars of the defendant concerns collided on the track, hurling the Baker machine against him.

New Incorporations.

Sutton Motor Co., New York; capital $200,000. Directors: Henri de Buren, Nelson Hiss and H. V. Rutherford.

The Laminated Auto Frame Co., Springfield, Ohio; capital $10,000.

The Detroit Auto Vehicle Co., Detroit; capital $150,000. Directors: F. H. Blackman, J. L. Hudson, H. H. Lind, B. Durzhuyer.

A. O. Smith Co., Milwaukee; capital $200,000. Incorporators: Arthur O. Smith, Charles G. Foster and Charles F. Hase.

The Columbus (O.) Automobile Engine Co. Capital, $10,000. Incorporators: G. B. Sid-Stechner, F. E. Stevens, Harvey Cockell, A. D. Sanderson, E. E. Main, E. G. Savage, S. B. Nace, E. B. Evans, M. A. Corbett, M. H. Neil, Albert Ross and W. E. Moling.

The Wilmington (Del.) Automobile Co. Capital $20,000. Incorporators: Horace W. Gause, Jos. Bancroft, Richard R. Banks.

Toledo Fire and Police Notification and Auto Parcel Delivery Co., Toledo, Ohio. Capital $25,000. Incorporators: Louis Lichtie, Geo. Harris, Chas. G. Wilson, Arion E. Wilson, Esther Dillon.

Boston Automobile Garage Co., Boston. Capital $25,000. Incorporators: Edgar A. Cook, Levi P. Blackford, Harry B. Hurd, George C. Souther, John M. Fisher.

New British Motor Propelling Device.

The British Detachable Motor Cycle Co. are placing on the market a motor-propelling device which can be attached to ordinary bicycles but does not increase strains on the frame of same, at least not in nearly the same degree as a motor supported on the frame would. It consists of a tubular frame supported at its forward end on the rear wheel axle of the bicycle and at its rear end on a special small rubber-tired wheel, this frame carrying the motor, which is connected by a chain to the rear wheel of the bicycle. The one difficulty one would expect with this construction is in turning, as the two rear wheels are rigidly held in the same plane, but the makers claim that no trouble is experienced from this source.

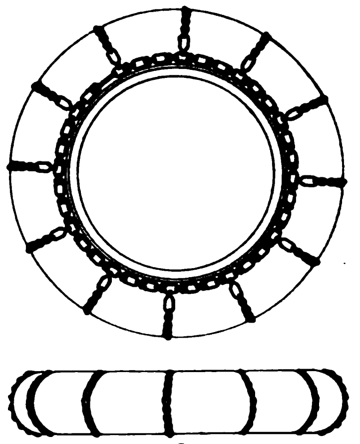
Charles H. Minchin, of Greenwich, Conn., on Tuesday was confronted with a choice either of running into a team of horses driven by H. P. Whitaker, of New York, crashing into a baby carriage in which an infant was asleep, or bumping into a rock at the roadside. He chose the latter alternative and Edith Gunth was thrown out and severely injured about the knees and ankles.

MOTOR VEHICLE PATENTS.

United States Patents.

768,495. Grip Tread for Pneumatic Tires.—Harry D. Weed, of Canostota, N. Y. August 23, 1904. Filed February 9, 1904.

The object of this invention is to provide a flexible and collapsible tread composed entirely of chains linked together and applied to the sides and periphery of the tire and held in place solely by the inflation of the tire, and which is reversible so that either side may be applied to the periphery of the tire, thus affording a double wearing surface. These auxiliary treads are adapted to be applied to the traction or driving wheels of automobiles, and one of the important objects is to enable any one to easily and quickly apply the auxiliary tread when needed by partially deflating the tire and then placing the grip thereon, and final-



No. 768,495.

ly reinflating the tire to cause the transverse chains to partially embed themselves into the periphery of said tire, whereby the auxiliary tread is firmly held in operative position against circumferential slipping on the tire.

This object can only be attained with a gripping device flexible in all directions both circumferentially and transversely as well as radially, so that when the tread of the tire is compressed by the weight of the load, the transverse chains across the periphery will have a free flexing movement which readily conforms to the varying cross-sectional contour of the tread of the tire and still maintain a firm grip thereon, and under such conditions it is imperative that the portions of the circumferential chains yield readily to the varying conditions of the transverse chains. The purpose, therefore, in constructing the gripping device wholly of chains is to permit the free flexing movement of the side pieces or anchors to which the cross-chains are secured, thereby obviating any liability of crystallization due to the bucking or irregular strains.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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Vanderbilt Cup Race.

At the time of writing, two days before the close of entries for the race, only two American manufacturers have yet entered cars, indicating that our manufacturers are not particularly anxious to win glories in the field of road racing, in which they are novices. The American machines will in this race be pitted against the most successful foreign road monsters driven by some of the veteran professionals, and their chances of success are no greater than they have been in any of the Gordon Bennett races of the past. That the cup will be corralled by a foreign team is a foregone conclusion, but that is absolutely no cause for regret. It would, indeed, be a blessing if the Europeans should capture everything extant in the way of racing trophies and carry it triumphantly across the water, as it would convert the American industry from the idolatry of "pewter pots" and favorably affect the market for American machines abroad, because the holders of all the records and trophies would be so occupied with contesting and defending their possessions among themselves that they would have little time left for supplying the market for pleasure and business vehicles.

Meanwhile a question has been raised regarding the danger of the course. The roads are for the most part narrow and very dusty in dry weather, and overtaking a preceding machine will be an extremely risky venture. The recent track accident at St. Louis has only increased the apprehension of danger. Oiling the roads has been suggested, as a means of reducing the risks, but as the receipts in connection with the race will be extremely small, and a deficit is almost certain, the most that can be done, it appears, is oiling the turns, at which points there is the greatest danger from dust.

New Models Out Early.

In most of the established automobile factories of the country, work on the models for next season is now well advanced, and some of the new types have already been completed. This furnishes a pleasing contrast to last season, and the indications are that there will be no repetition of the failures to make promised deliveries, and consequent dissatisfaction of impatient purchasers and cancellation of orders, which marked the beginning of the present season. The reasons have never been fully explained, but it is a fact nevertheless that at the time of the two national shows last winter, most of the exhibitors had made as yet absolutely no arrangements for running through a series of the new models shown and some were even undecided whether they would manufacture the exhibited models or not. A number of the more prominent exhibitors made radical changes in the exhibited models after the shows before ordering parts. There seemed to be an impression prevalent that the market this year would not be very large, and, on the other hand, it is believed that many manufacturers expected to see at the shows some radical, fashion-setting innovations by which they might profit if they delayed their arrangements for the season's output. These expectations were not fulfilled, but a great deal of annoyance was caused by the undue delay, and no doubt a considerable loss sustained in some instances.

All this will be changed the coming season, to the advantage of both the trade and the consumer. A very considerable demand for cars is expected for next year, and most of the manufacturers will have a batch of machines well on the way to completion at the time of the national shows. Deliveries of the new models will in many instances begin before the pleas-

ure-driving season opens. The advantage to the trade resides in the fact that the "dead" season, extending ordinarily over the Fall and early Winter, will be materially shortened, bringing the industry more onto an all-the-year-round basis. A plant working to its full capacity during the entire year can obviously be operated much more economically than one lying idle nearly half the time, because the expenses independent of operation continue undiminished during a period of idleness, and also because labor can be employed on more advantageous terms in an industry offering steady employment than in one subject to alternate seasons of dullness and activity. The manufacturers are much concerned over the problem of distributing the work of production fairly evenly over the whole calendar year without the necessity of tying up an immense capital in stock on hand at any time, and it is this consideration, more than anything else, which has led many of them to take up the light delivery wagon problem. There are no seasons in delivery wagon work, and this branch of the business can be pushed to furnish employment for the otherwise dull season, while a let-up in this line may be found advisable for the season of activity in pleasure cars.

The advantage of an early season to the purchaser lies in the fact that there is less temptation to venture on long runs shortly after the delivery of the car, and the new owner will take more time to thoroughly study his car and gain proficiency in its operation by short runs near his home, thus largely avoiding the usual early troubles due to inexperience.

Moderate-Priced Four-Cylinder Cars the Coming Leading Type.

A pleasing sign of the times, marking the passing of the spirit of secretiveness in the automobile industry, is the openness with which the manufacturers talk this Fall about their plans for next year. Even as late as last year, it was the desire of every manufacturer to "spring" his new ideas on the public at the New York show, and it was absolutely impossible to obtain particulars of some machines before the opening of that show. It is quite the reverse this year. Even at this early date, it is a matter of general knowledge in the trade what type of car is being worked on in the drafting rooms and the experimental departments of the different factories, and the manufacturers show no hesitation in taking men connected with the trade papers through their experimental departments and showing them their new creations in process of construction.

It would, of course, be ill-advised to give descriptions of any of these machines before all their details have been decided upon and the manufacturers are ready to accept orders, but a few words in regard to general tendencies may be timely and of interest.

The leading feature of the progress of the industry as characterized by the new models is the fact that the manufacturers who in the past have catered to the demand from men of moderate means, and built single and double cylinder cars, have almost without exception taken up the four cylinder machine. Of course, the four cylinder car was already largely in evidence at the shows last winter, but most exhibitors of this type of machine built for the wealthy classes only, and the prices ranged from $3,000 up. The object of the present movement is to create a large market for four cylinder cars by reducing the price to a figure within the reach of much greater classes. The price of a car is, of course, one of the last things decided upon, and while no definite information is yet available in any case, in many instances it is hinted that it will be either $2,000 or somewhat less. It is, of course, not to be understood that all four-cylinder cars will next year be obtainable at this price, as the highest grade American machines will undoubtedly continue to sell at $3,000 and over; but that there will be a large variety of four cylinder cars of reputable make, with moderately good finish, and devoid of unessential refinements, which will be offered at this figure.

As a consequence of this "landslide" in favor of four-cylinder machines, it will probably be impossible next year to sell a two cylinder car at over $1,800. While a two cylinder machine of superior construction may be more expensive to produce and intrinsically much better than a four cylinder roughly "thrown together," the average purchaser is much less easily convinced of differences in quality of material and workmanship than of the superiority of cylinder multiplicity- a fact which any manufacturer who is yet undecided as to his next year's product will do well to bear in mind.

A new general type of car is really being produced in these moderate-priced four cylinder machines, a car devoid to a certain extent of the luxuriousness which has hitherto been associated with four cylinder construction, but possessing all the mechanical efficiency of that type of machine. It will form a happy mean between the high-priced touring car and the cheap runabout.

Imprisonment for Speeding.

The first instances of automobile drivers being committed to jail in this country for speeding beyond the legal limit, occurred in Newport, R. I., last week, when Judge Baker sentenced two chauffeurs of wealthy cottagers to five days' imprisonment in the county jail. The first of the two cases was a second offense, the same party having been fined $15 for the same offense a week earlier. According to the complaining witnesses, the speed of the car was about 30 miles per hour. In the other case the chauffeur drove a number of women servants of his employer to church on Sunday morning, and "hit up" a fast clip and collided with a cab, with the result that one of the women in the car was thrown out and seriously injured.

Residents of the fashionable resort have been troubled for some years by the capers of automobilists affected with the speed craze, and there have been many arrests of chauffeurs, and of amateurs as well, but they had so far always been released upon paying a fine of $10 or $15. However, whether the millionaire owners of the cars or their chauffeurs were arrested, the fines were invariably paid by the former, to whom the insignificant sum is of absolutely no consequence. It appears from the sentences of last week that the judge who imposed them is of the conviction that the jail penalty is the only effective means for suppressing speeding in that locality. If the cases had occurred in any of the large cities there would undoubtedly have been some to accuse the judge of currying favor with the proletarian voters, but this could hardly be put forth as a possible motive in Newport. The fact is that many of the residents of the city have been demanding that stricter measures be taken to prevent the thoroughfares of the city being used as race courses and their lives and limbs jeopardized.

Force Feed Lubricators.

By Albert L. Clough.

feed lubricators are rapidly sup- other systems for furnishing a s supply of liquid lubricant to the urfaces of high grade automobiles. e largely displaced the gravity feed account of the following advan- ch they are considered to possess: rce feed lubricator is decidedly ain to deliver the oil under vary- tions than is the gravity or hydro- e as exemplified by the ordinary y the oil reservoir having feed ding from it. In the gravity cup acting to secure the feed is minute sisted by forces nearly as great as ving so small a margin of feeding o be incapable of overcoming any obstruction or any change in con- The force acting to feed oil from cup is simply the liquid pressure e height of oil in the cup and the sisting it are the cohesion of the of oil—its viscosity—and the ad- the oil particles to the surfaces h they are in contact. The differ- ween these opposed forces is so pecially when a slow feed is used, lightest obstruction may cause the cease. An undue increase in the of the oil, caused by a reduction rature, may render the molecular forces of cohesion and adhesion the force exerted by gravity, and will cease. Sufficient reduction of ure may cause the oil to be prac- iaffected by the force of gravity; it may become stiff enough to one" and assume a buttery consis- which condition a gravity feed out of the question.

UPERIORITY OF FORCE FEED.

he force feed system, on the other arrangement may be such that a very considerable magnitude, such erted by the piston of a powerfully rce pump, may determine the feed. orce is very great in comparison resisting power of accidental ob- , and very large with relation to ble forces of cohesion and adhe- h tend to resist the flow. A feed gh sure to take place under such s.

feed lubricator is also superior in ay be arranged to furnish a pre- d amount of lubricant in a given spective of any change of viscosity due to a reduction of its tempera- may be constructed so as to accu- intain the rate of feed with a high f certainty. The gravity system il at a variable rate which depends viscosity of the lubricant, which s conditioned upon the tempera- decided change in temperature re- marked increase or decrease in of feed. An engine with gravity lubrication when started cold usually receives oil at a slower rate than it does after it has raised the temperature of the lubricant supply.

The force feed system, owing to the very considerable pressures which are employed upon the feed lubricant, is adopted for oiling points which are at some distance from the oil reservoir, or which are above it. On the other hand, the gravity feed obviously cannot supply wearing parts which are above the lowest level of its reservoir and cannot with certainty distribute its supply to points far away from the reservoir, owing to the danger of these pipes clogging during viscous conditions of the lubricant. Unless the reservoir is greatly elevated, the feeding force is very minute, and the adhesion of thick oil in a long, fine pipe may very often be sufficient to counteract it.

THE FEATURE OF AUTOMATISM.

One great advantage of the force feed system arises from the fact that the pressure which causes the feed is derived by mechanical or other means from the motion of the machine which is to be lubricated. If the machine is at rest, no feeding pressure is maintained and no oil is fed. Immediately upon the resumption of motion of the machine, the feeding force is at once automatically restored and the supply of oil at once renewed. This condition of affairs is almost ideally automatic, and results in a high degree of economy in oil and the avoidance of the flooding of portions of the mechanism when not in operation, with a consequent waste of the lubricant.

Gravity feed lubrication requires to be shut off by hand when the machine is stopped, and this necessary act is frequently neglected, with unpleasant consequences. It is, of course, of even greater importance that the gravity feed should be turned on when the machine is started, and serious consequences often result from the neglect to do so. Some manufacturers seek to prevent the possibility of neglect by the operator of their gravity feed lubrication devices by interconnecting their oil valve with the sparking switch in such a manner that ignition cannot be secured without starting lubrication, and that ignition cannot be stopped without a cessation of the oil supply.

WEAKNESSES OF THE FORCE FEED.

Naturally enough, the force feed system labors under some disadvantages. A certain degree of complication is inseparable with an oil pumping system, and with this complexity inevitably comes the possibility of failure in operation. Gravity is an absolutely constant force, while the action of mechanically operated pumps is dependent upon the mechanical integrity of a train of moving parts which are subject to possible derangement.

Any device which is supposed to be automatic, as force feed lubricators are, is considered to require no attention, since its construction is explicitly intended to supplant human watchfulness. There is a tendency to place full faith upon a force feed lubricator and to regard it as infallibly automatic, and the operator generally withdraws from it the careful oversight which he would give to gravity feeds and leaves it alone. Now, no automatic device is, or ever can be, infallible, and sometimes the feeling of security which such a device engenders does not prove to be warranted. In the occasional instances when force feed lubricators fail to work through a failure of the mechanical connection, the results may become serious before the defect is realized, and they may extend to all parts of the machine, while the stoppage of a gravity feed is likely to cause only local injury. Force feed lubricators require frequent inspection, despite their highly automatic character.

Again, automatic lubricators using mechanically driven pumps, require to be located where a convenient connection can be made with the engine, and this is not easy to secure, considering the crowding of parts which seems to be inevitable in automobile construction.

Force feed lubricators as generally employed are of three classes:

(1) The gas pressure type.
(2) The single pump type.
(3) The individual pump type.

GAS PRESSURE LUBRICATORS.

In the first system the surface of the oil in a tank is acted upon by a gas pressure derived from the compression produced in the crank case of double opposed cylinder motors, and in others by the explosion pressure in the cylinder or by the exhaust pressure in the muffler. Oil tubes lead from the bottom of the tank through sight feeds to the various wearing surfaces of the machine. A check valve opening outwardly from the crank case, cylinder or muffler, allows the gaseous pressure to be communicated to the top of the oil reservoir through a suitable pipe. Ordinarily the top of the tank is provided with a small escape valve which may be finely adjusted. An inwardly opening spring oil check is usually employed at the end of each feed tube where it enters its delivery point.

The action of the lubricator is as follows: Until the engine is started the gas pressure above the lubricant is that of the atmosphere. When, however, the engine is started slowly, gas enters the space over the lubricant at a greater rate than it can find exit through the escape valve and a pressure is created which acts upon the oil and forces it at a comparatively slow rate through the sight feeds and feed tubes. The rate of flow is capable of adjustment by needle valves. As the engine is speeded up, a greater quantity of gas enters the reservoir, and as the rate of relief through the escape valve only increases slowly, a greater proportion of the entering gas is

retained and the pressure on the oil is increased, which results in the more rapid flow which the higher speed of the engine demands. The supply of oil is thus roughly proportional to the engine speed. When the engine stops the gases escape from the reservoir through the relief valve, the pressure immediately runs down and lubrication ceases.

Such a device is extremely simple. The reservoir may be placed on the dash or in any other convenient location. Sufficient warmth is communicated to the oil by the entering gas to appreciably warm it during cold weather. On the other hand, a device of this sort does not measure oil accurately to each bearing as some others do, and is not infallibly positive as regards the individual feeds, as one or more of them may become obstructed. However, the latter contingency is rendered decidedly remote through the considerable magnitude of the feeding force which is applied. The volume of the feed is reduced by any increase in the viscosity of the lubricant, but in no such degree as in the case of the gravity feed system.

SINGLE PUMP SYSTEM.

The single pump system consists of a plunger pump operated mechanically from some moving part of the engine. The pump constantly draws lubricant from a supply tank and forces it into another tank in which it is maintained under a predetermined pressure through the action of a pressure regulating valve in control of a by-pass through which the excess of oil is returned to the storage tank. From the pressure tank the lubricant passes through an adjustable needle valve, a sight feed glass containing water or glycerine, a pipe and an oil check-valve to each of the points requiring lubrication. The oil pressure tank and the sight feeds may be mounted upon the dash in full view of the operator, and the pressure regulating valve and pressure gauge may be conveniently placed for regulating the flow.

In this system a slow-speed oil pump of the plunger type is employed, which should be positively driven from the engine by means of gears or sprockets and chain. The pump may be of such liberal size that its check valves may be of a reliable character and its piston capable of being packed when worn. So considerable a pressure may be maintained upon the lubricant as to render very unlikely the clogging of the feed tubes through an increase of viscosity of the oil or any accidental cause.

The supply tank may be carried in any convenient place upon the vehicle, preferably where the temperature will be influenced by the heat from the engine. A suitable location for the pump, where it may readily be driven, is usually to be found. In this system the rate of feed of the lubricant is constant so long as the pressure remains the same, and equal quantities of *oil are fed in* equal time intervals, *irrespective of the speed at which the engine* and connected mechanism may be turning. This may, perhaps, be considered as a disadvantage.

INDIVIDUAL PUMPS.

The individual pump system provides a separate mechanical piston pump to furnish the supply to each feed tube. Such a lubricator usually consists of an oil-containing tank through which passes a shaft maintained in constant slow motion by means of a mechanical connection with the engine. This shaft successively operates by means of cams, or some equivalent device, a series of small piston pumps, usually submerged in the oil. These pumps are almost always provided with suction and discharge check-valves, consisting of a steel ball in a brass seat. Each pump being submerged during the filling stroke draws its charge from the oil immediately surrounding it, and in the discharge stroke a definite amount of lubricant, equal in volume to its piston displacement, is forced through the feed tube to its respective bearing.

The piston displacement of each pump may be independently adjusted by changing the length of stroke, so that an amount of oil, ranging from a very little to the full working capacity of the pump cylinder, may be delivered to a certain feed tube at will. As each pump stroke corresponds with a definite number of engine strokes, and as each pump stroke discharges a definite amount of oil, it is evident that an exact amount of lubricant is fed the engine and other parts per motor stroke—which is the desired condition. The supply is, of course, begun when the engine is started, and stopped when it is shut down. A slow, continuous cam motion may be used in driving the pump pistons, or the driving shaft may act to compress springs, the release of each one of which may impart a sudden motion to its respective pump plunger. The slow motion of the driving shaft may be secured by a step-by-step motion, operated through a connection with some reciprocating part of the engine, actuating a pawl and ratchet or roller friction device, or it may be obtained by reduction gearing—the worm and wheel being a favorite expedient. The discharge tubes may be supplied with sight feeds if desired.

Such a lubricator should be very certain in its action, as it is hardly likely that any change of viscosity in the lubricant, or any accidental obstruction in the pipe could resist the principal pressure of the pump. When a certain pump fills with oil, that oil must be discharged through its own tube and can go nowhere else. Its accuracy has already been commented upon. In the "engine in front" type of car, such a lubricator can be mounted upon the dash and still be conveniently driven. In this location it is constantly under inspection. Upon cars with engines in the body it cannot so easily be located as where it is in sight and the mechanical construction still secured.

The most common cause of faulty action in lubricators of this class lies in the failure of action of the suction valves of the pumps. If, from any cause, a suction check valve sticks on its seat with sufficient force to enable it to resist atmospheric pressure, no charge of oil will be drawn into the pump cylinder, and, on the other hand, if the suction check fails to seat, oil will be uselessly sucked into the pump cylinder and returned to the tube during successive strokes. These ball check valves are very small and somewhat delicate in these small pumps.

OBVIATING BALL CHECKS.

One manufacturer has sought to obviate the use of ball checks by making use of oscillating piston pumps. In such a pump the cylinder is mounted upon trunnions and its lower end is formed on the arc of a circle, so that it may be in continuous contact with a plate valve which carries the suction and discharge ports. Upon the beginning of the suction stroke the cylinder is in such a position that its opening is directly in line with the suction port and the cylinder is filled by the outward movement of the piston in the usual manner. The discharge port is meanwhile kept closed by being covered by a projection of the cylinder port. Just as the outward stroke is being succeeded by the inward or forcing stroke, the cylinder is oscillated so that its opening comes into connection with the discharge port. At the same time the suction port is covered by the projection of the cylinder foot. The oil is forced through the delivery port in the usual manner, by the inward piston stroke. The combined reciprocating and oscillating motions are secured by simple mechanism, and it would seem that the absence of check valves and the mechanical operation of the plate valve should render the arrangement almost proof against derangement.

LITTLE WEAR OF OIL PUMPS.

Since the working parts of mechanical lubricators of the individual pump type operate submerged in oil, and move at very slow speeds, their wear is very slight indeed. The greatest care should be taken to secure a positive drive for such a lubricator. Gears furnish the most reliable connection, but a chain and sprockets are fairly reliable.

The thorough filtration of the lubricant before it enters the supply tank is a matter of the utmost importance, as the presence of foreign particles in the oil is the most prolific cause of valve troubles and clogged feed tubes. A strainer is usually provided, so arranged that the oil is filtered when the tank is filled.

By no means all the lubricators upon the market are supplied with sight feeds, but it is believed that they should be employed in all cases where practicable, as the sight of the oil entering the feed tubes is the only infallible proof that lubrication is being effected. An occasional glance at the sight feeds is a safe precaution, no matter what type of lubricator is used.

Graphite in the Cylinder.

By Frank N. Blake.

On account of the great heat to which it is subjected, and also because of its need of thorough lubrication, the cylinder of a gasoline automobile is a most appropriate place in which to use such an indestructible and efficient lubricant as graphite. It is unfortunate that there are difficulties in the way of feeding it continuously, in the same manner as oil is used; if mixed with oil it obstructs its flow through the ordinary oil cup, and soon settles and stops the flow altogether, thus defeating the purpose it is intended to serve. Fortunately, the intermittent use of graphite is attended with substantial and comparatively lasting benefit, and until some better way is devised it will pay the user of a gasolene engine to put in a dose of graphite from time to time, say, every day or two, even though it costs him a little time and trouble to do so.

One user has recommended blowing the graphite into the cylinder through the spark plug opening, first having placed the piston at the opposite end of the cylinder so as to leave as much as possible of the cylinder wall exposed to the flying particles. The oily interior of the cylinder catches some of the powder and a noticeable improvement in the running of the motor is effected by this periodical treatment.

A better way to introduce the graphite is to unscrew the spark plug and screw into its place a short nipple having a little hopper or funnel soldered to one end, and having an opening of, say, one-sixteenth of an inch; turn the flywheel until the piston is beginning the power stroke and then put about half a thimbleful of graphite into the hopper and turn the flywheel forward half a revolution, and so suck the graphite into the cylinder in a form which may be compared with spray; if some of the graphite is inclined to stick to the side of the funnel, a few taps on the side of the nipple will dislodge and send it in with the rest.

If the engine has an automatic inlet, the valve should be held closed if practicable, or, if possible, the opening admitting air to the carburetor should be closed; if neither of these things can be done, then most of the inlet can be closed by means of the throttle. Do not turn the flywheel far enough to open the exhaust valve, or some of the powder may be expelled through it.

A quick and easy way to tell when the power cycle is about to begin is to set the spark lever for late ignition, switch on the battery and then turn the crank slowly, stopping when the vibrator begins to buzz. This will indicate the beginning of the power stroke, if the adjustment is right.

Before putting graphite into the cylinder by either of the methods mentioned, the cylinder should be oiled freely, so that its interior will be in the best condition to catch and retain the powder.

The use of graphite is not to take the place of the usual oil, but rather to act with it and add to the general lubrication, which it does very effectively.

The periodical use of graphite exerts a beneficial influence on the cylinder and piston for a much longer time than would be expected, and its occasional use not only helps the machine for the time immediately following, but also helps out at times when the oiling device is either partially or wholly clogged, or when the operator forgets to turn on the oil; sometimes partially empty oil cups are overlooked, and not refilled; at other times the cups have an unaccountable way of feeding a hundred mile supply of oil, while going only half that distance. Thus there are plenty of times when the cylinder stands in need of all the help which can be given it. When it is remembered that the cylinder is the part which suffers first and most severely from insufficient lubrication, and is, unfortunately, the most expensive part to replace in case it becomes damaged, it behooves the user of an automobile to adopt every reasonable precaution tending to keep it in the best condition.

With some engines, or with some spark plugs, or with certain locations of spark plugs, there is a possibility of trouble in using graphite from its short-circuiting the plugs, though probably this could be avoided by using a smaller quantity at a time; but it is worth while to use the graphite even if some temporary inconvenience is occasioned thereby; the chances are that it will give no trouble, and if it should, the plug can be cleaned and less graphite used the next time.

The operator of an automobile who has not already done so, should make a trial of graphite, in spite of the fact that the method of using it is far from an ideal one theoretically; so long as he is not able to use a little at each stroke of the piston, or just so much in a given number of seconds, let him be willing to use it intermittently, consoling himself with the reflection that though theoretically all lubricants should be applied to bearings continuously, yet it is found in practice that it is amply sufficient to lubricate some parts only once in several days.

If the operator is observing, he will not fail to notice that after using graphite a few times, other conditions being equal, his engine will run faster than it did before, proving that part of the power formerly employed in overcoming friction—and wearing out the engine—is now available for doing useful work instead of actual damage.

The Gyroscope—II.

By E. J. Stoddard.

In the last article we observed the following facts: When a wheel is spinning about an axis at its center perpendicular to its plane of motion and is rotated about a diameter, there will be

1. A rotation, called precessional, about an axis at right angles to the other two axes, if it is free to so rotate.

2. If it is prevented from rotating about the third axis, there will be a torque tending to so rotate it, and this torque is expressed by the following equation:

$$T = \omega \Omega I,$$

where T is the torque; ω, the angular velocity about the diameter; Ω, the angular velocity of spin; and I the moment of inertia about the center of the wheel.

3. That if rotation is prevented about the third axis, the spinning has no effect to resist the rotation about the second axis; that is, about the diameter.

From this last fact a curious consequence seems to follow.

Suppose the wheel to be spinning with a constant angular velocity, and suppose a constant torque T_1 to be applied to rotate it about the second axis. Neglecting friction, the constant torque T_1 will continually

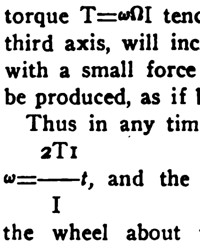


Fig. 1.

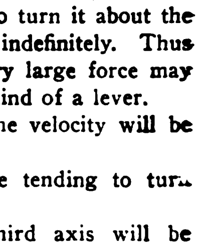


Fig. 2.

accelerate the angular velocity ω, and the torque $T=\omega\Omega I$ tending to turn it about the third axis, will increase indefinitely. Thus with a small force a very large force may be produced, as if by a kind of a lever.

Thus in any time t, the velocity will be $\omega = \frac{2T_1}{I}t$, and the torque tending to turn the wheel about the third axis will be $T = \frac{2T}{I}\Omega I t = 2T_1\Omega t$, a result directly proportioned to the time t during which the torque T_1 is acting and independent of the moment of inertia of the wheel. It is to be noticed also that $T=T_1$ when $t=\frac{1}{2\Omega}$.

Thus if a wheel is spinning with a velocity of 1200 r. p. m.=20 revolutions per second, or 20x6.2832=125.664 radians per second—the two torques would be equal in $\frac{1}{251}$ sec.—and, of course, in one second $T=251T_1$, and in two seconds the precessional torque is 500 times the force tending to rotate the wheel about its diameter, and so on.

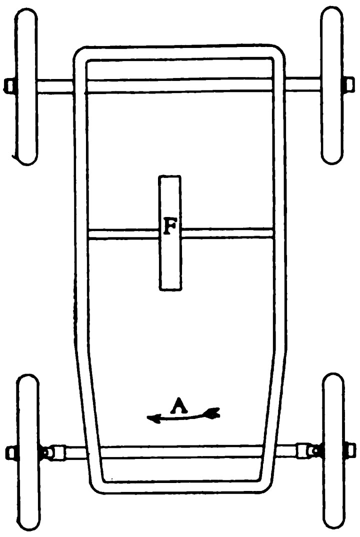


FIG. 3.

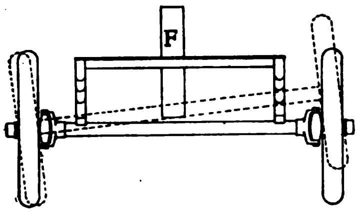


FIG. 4.

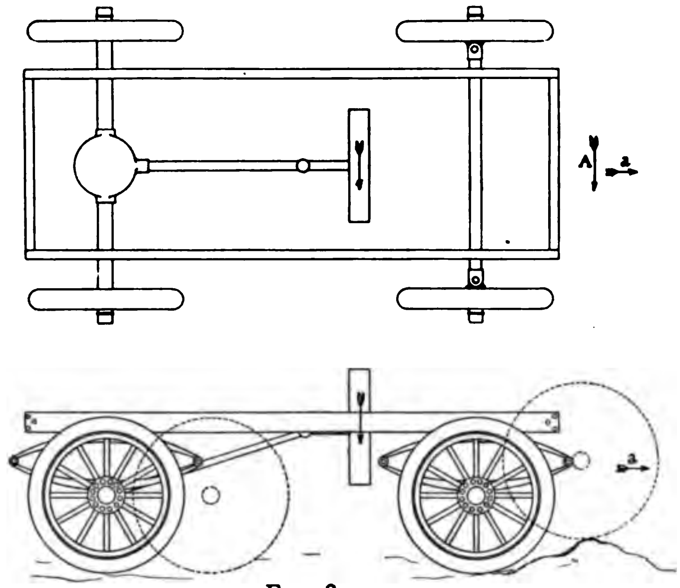
There is a top on the market that serves very well to illustrate the gyroscopic action of a fly-wheel on a vehicle. Fig. 1 is an elevation of this top and Fig. 2 a vertical section; A is a sheet metal casing; B is a shaft pivoted in the casing, having its end *b* extending outside. C is a heavy wheel on the shaft B within the casing A. The wheel C is whirled by a string wrapped around *b*. A bead *a* passes around the casing A.

In automobiles there are two cases to be considered—one where the fly-wheel turns in the same plane as the carriage wheels, as in Figs. 3 and 4; and the other where a bevel gear drive is employed and the fly-wheel spins in a plane at right angles to the plane in which the carriage wheels are turning, shown diagramatically in Figs. 8 and 9. Suppose the fly-wheel to be turning in the same direction as the wheels, and suppose the "port" wheels to pass over something in the road to tilt the vehicle as indicated in dotted lines in Fig. 4. The fly-wheel F and the four vehicle wheels will have precessional torques tending to turn as indicated by the arrow A. If it cannot turn, the precessional torque simply acts to strain the parts and increase the friction on the bearings; if it does turn, say with a velocity ωp, this turning gives rise to a reactional torque $\omega p \Omega I$, tending to resist the tilting, and acting very much like an additional dead load compressing the tires and retarding the progress of the vehicle. It is to be noticed that the precessional torque tends to prevent the obstruction from turning the carriage in the opposite direction to that indicated by the arrow A.

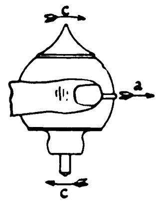
If we take the top between the thumb and finger with the wheel spinning as indicated in Fig. 5, holding the bead loosely so that the top can turn itself as indicated by the arrows *cc* in Fig. 7, move it as indicated by the arrows, *a*, and twist it quickly as indicated by the arrows *b, b*, Fig. 6, we shall have a parallel case to that just described, and we will notice a violent turning in the direction of the arrows *cc*, Fig. 7, and also a decided resistance to the twist given by the fingers and illustrated in Fig. 6. If we hold the top so hard that it cannot turn, as indicated in Fig. 7, we shall notice that it resists the twist given by our fingers much less.

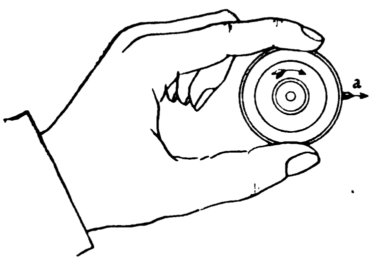
The second case, with bevel gear drive, is illustrated in Figs. 8 and 9. In this case the precessional torque of the fly-wheel is created by end-wise tilting, as by running over a "thank-you-marm." It is to be noticed in this construction that the action that invokes the precessional torque of the fly-wheel, does not produce such an effect with the vehicle wheels and vice-versa. If the motion is in the direction of the arrows *aa*, the tendency to turn horizontally is in the direction of the arrow A.

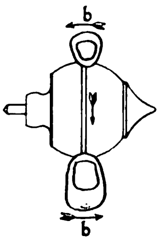
This action may also be illustrated with the top as shown in Figs. 10 and 11.

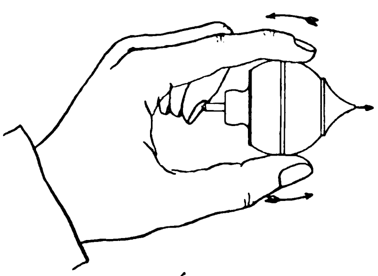


FIGS. 8 AND 9.









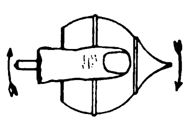


FIG. 5. *FIG. 7.* FIG. 6. FIG. 10. FIG. 11.

Stopping Tests in Chicago.

A number of the officials of the Chicago Automobile Club made a series of stopping tests on the Lake Shore drive on Aug. 26th for the benefit of the city authorities. The members of the Board of Automobile Registry, together with the city electrician, health commissioner and assistant corporation counsel, were present and noted the controlability of the various cars.

A 2,400-pound car running at ten miles per hour was easily brought to a stop in ten feet, the distance described by the ordinance now in force. It was demonstrated that a car traveling at the rate of twenty miles per hour could be stopped in forty feet. None of the six cars used failed to stop in less than ten feet when traveling over the course at the rate of ten miles per hour.

F. C. Donald, former president of the club; President Farson, Secretary Gorham and Mr. Frey, of the Racing Board, were among those who supplied cars for the tests, the object of which was to demonstrate that the speed limit of ten miles per hour is unnecessarily low. The club is anxious to obtain from the City Council several modifications of the present ordinance, and is taking measures to that end.

LESSONS of THE ROAD

g on the Prairies of North Dakota in an Automobile.

By T. E. Mather.

ırchased my automobile, a 14-horse ; car, last year, but after a month's ‚arm weather and the approaching g season caused us to renew our an- ilgrimage to the inviting, never-fail- lightful coolness of a summer cottage shores of Devil's Lake, North Da- ıearly five hundred miles northwest ıneapolis.

Ides guns and plenty of ammunition, rse, the new auto must be a part of ıipment for the three months' outing. er to make the trip overland in the r to ship it by rail was duly consid- ıut when reliable chauffeurs told me r experience of sandy roads encoun- n the lake region of Minnesota, I de- o send the machine by freight. Speak- freights, why is it the railroads insist h extortionate rates on automobiles? ır weighs just two thousand pounds, : freight to Minnewaukan, North Da- ınd return was $102, or about $5.10 ıdredweight, which is more than five he tariff demanded on ordinary farm ; and other classes of machinery.

boundless prairies of North Dakota ıal for automobile touring; no sand, r stumps to contend with, and in the ıson the roadbed is nearly as firm as macadamized, and the ever active sweep every atom of dust from it. machine is so constructed that there clearance beneath it—say 14 inches e—you are safe in throwing the speed ıto the high notch and touching up elerator for a thirty-mile gait if you However, if your car is built low, e vital parts of the machinery hang- a few inches above the ground, you ıt find it adapted for safe speeding rie roads, for this reason: All West- ıds, built by nature and worn by are on every incline more or less down where animals' hoofs and wheels have for years constantly l in the same path, leaving a high ı the center of the road, often a foot ıd you are liable to encounter these ons unexpectedly and where it is dif- turn out. The West is full of am- progressive, sport-loving people ealth and inclination to own good ıt manufacturers will have to con- he impracticability of the low-con- l car and build in such a way as to ell in the center if they expect to the country trade of the great West. smen from all the central West have cognized North Dakota as the hunt-er's paradise. True, the great herds of buffalo and antelope have given way before the march of civilization, but grouse, chickens, ducks and geese are still plentiful. For twenty-two seasons I have enjoyed roaming the Dakota prairies with gun and dog. A well-trained horse that would stand any place had until last season been a part of the necessary equipment, but who wants to ride behind a horse after having experienced the fascinating delights of an automobile? Accordingly, I determined on hunting from my touring car. I made a mistake, however, in not familiarizing my hunting dogs with auto riding before the hunt.

Car Used on the Hunting Trip.

The shooting season in North Dakota opens Sept. 1, and every sportsman attempts to make a good showing the opening day. So on that September morn the friend I had invited placed his hunting paraphernalia and setter dog in the tonneau along with my outfit of guns, big pointer and water spaniel, and we were off for a promising field twenty miles from the village. But the dogs evidently did not appreciate our modern conveyance, and our cajoling and caressing was wholly unsuccessful in breaking the "sulks" which was plainly manifested in each of the three dogs. The machine had soon covered the twenty miles, and amid the great fields of grain in shock, we turned the chicken dogs loose, expecting them to range through the stubble, keen for the scent of wild game. But they were not in the hunting mood; they had been forced to ride in a horseless wagon against their wishes, and did not propose to have anything to do with us or the game either. My companion, with gun in hand, tramped through the fields with them, hoping to

Method of Roping Wheels for Fording Creek.

break the "spell" by coaxing the dogs and occasionally firing his gun in a vain attempt to enthuse them with the sport. It was useless, and with patience exhausted he returned to the auto, and again I started the machine, whistling the dogs to follow. Not much; they did not propose to follow a gasoline "chug-chug," no matter if it did cost more than two thousand plunks. Instead, they showed their utter disgust by leaving us and making back tracks for home at a rapid rate.

We must recapture them, or the day's sport would be spoiled, and we were soon in hot pursuit. Overtaking them was easy, but to get hold of them was a different proposition. After a nine-mile chase the dodgasted brutes were so thirsty and warm they were pleased to plunge into a watering trough by the roadside, and while they indulged in a bath we collared them and again placed them beside the retriever in the car, and once more started for the scene of operations. By this time we knew the birds had secured their morning meal and were "lying low" in some grassy retreat, as is their custom between 9 A. M. and 4 P. M.; besides the dogs were completely petered out, so we struck camp near Fish Lake (so named because it never had a fish in it). Here we ate our lunch, smoked cigars, fed and petted the dogs, telling them what fine hunters they were in our effort to "stand in" and induce them to forget their first auto ride.

Toward evening we again commenced to skirmish around in search of chickens and grouse, but the dogs had not recovered from the imagined insults of auto riding and retreated into the tall grass, where they successfuly eluded our careful search. We were determined not to abandon all the shooting, however, and later located ourselves on what I knew to be an excellent duck pass and awaited the evening flight, my handsome curly retriever close by us under cover, eager for the crack of the gun and orders from his master to "go fetch" the fallen fowl. He had been trained to bring the game in and drop it at my feet or to carry it to the wagon. We had left the car behind a nearby ridge out of sight. At sundown the flight was fast and furious, and we kept the guns hot, with fatal results to the ducks, and the intelligent water dog was kept very busy. He evidently preferred to pass over the ridge toward the auto rather than work his way through the tall reeds where we made our stand, and we admired his own good sense.

We were dropping mallards, redheads and teal all around us, and had soon killed the limit allowed by law—25 birds for each hunter—and reluctantly retraced our steps to the auto, where we expected to find fully fifty plump birds lying in a heap beside the machine, just as "Mike," the spaniel, had left stacks of game beside the buggy on hundreds of former hunts. Imagine our *surprise and* chagrin to see that confounded dog take the last duck over to another hunter's buggy, where he had deposited the whole bunch. The owner of the rig was an unscrupulous "pot hunter," and hastily drove across a marsh, where automobiling was out of the question. With a fiendish laugh, he waved his hand at us with a tantalizing "ta-ta," and gloated over a wagonload of our ducks. Then, under cover of friendly darkness, we returned to the village, anxiously hoping we might avoid coming in contact with other hunters who we knew would inquire as to the success of our hunt in an automobile—a heretofore untried experiment in this locality. But the truth finally leaked out, and the neighbors who had in previous years been given a share of our hunting spoils, and were disappointed in the visible "returns" of that hunt, guyed us unmercifully. We had fully decided that ourselves and families were all to miss the usual game dinner which had never before failed to follow the opening day hunt, but my sixteen-year-old boy came to the rescue. The "kid" had walked out of town only a mile, where, without a dog and only a little single-barreled shotgun, he had killed seventeen fine prairie chickens, and we feasted just the same. For a time it was embarrassing to be joshed by the boy and others, but I am happy to say that later in the season the dogs all became reconciled to hunting trips in an automobile and were eager to follow the toot of the horn or ride with guns in the tonneau, and ofttimes redeemed their great hunting reputations; even the retriever learned to land his birds at the auto; and after the first trip our success was excellent and the rides delightful.

A Summer Tour in Central California.

By J. C. Cunningham.

From the lower Sierra mountains, across San Joaquin Valley, over the Coast Range to Del Monte and return via Santa Cruz, San Francisco and Stockton, was a trip taken by myself and little family last August.

Our carriage was a late flash boiler steam car with encased engine. I made no changes in the car except improvising a box, covered with oil cloth, to fit in between the two front springs, which I called my jockey box, using a mountain teamster's term. In this box was stored a variety of articles—overalls, jumper, cylinder oil, quart of kerosene, several bottles of soda water wrapped in wet waste, two or three small packages of fruit and a little of Cutter's rattle snake cure for my own use in case I should accidentally get bitten. We took no lunch, as we intended eating wherever convenient. We did not want to leave until late, on account of warm weather, so did not get started until 4.20 P. M.

It was our intention to make Los Banos, 65 miles distant, that night and stop there. The old steamer, as I always call her, did not steam up as usual when we started, and it took about an hour, including several stops for teams, to reach Merced, the county seat of Merced county, 16 miles from our starting point. I might say here that I have made the same distance when the roads were clear in 37 minutes. We stopped in Merced long enough to get gasoline, also replenish our water and add a few more articles, such as chain graphite, cement, etc., to the jockey box. Leaving Merced about 6 P. M., we started for Los Banos, 49 miles further on. The old steamer was still not working right, as the steam gauge needle did not play around the 250 and 300 marks, and she did not act as if she wanted to run away, as usual; still, she had all the speed the roads would allow.

Ten miles out of Merced we ran across a crowd of campers who had stopped for the night at a ranch house. They had their tents spread, three in number, and were just going to eat their dinner (as they called it), having had nothing since morning. We knew them all, and they insisted on our eating with them, which we did.

We were still nearly forty miles from where we intended to stop for the night, but this did not trouble us, as we would rather ride at night than in day time, on account of the heat. After eating a hearty meal of cold ham, sardines, fried rabbit, water melon and other good things, we prepared to move on, when the crowd again insisted that we stay with them over night. They had plenty of tent room, also enough bed clothes, they said, and could see no reason why we should leave them. We accepted the invitation after a little deliberation, and I can truthfully say that we enjoyed it far more than stopping at a hotel.

They, too, were on their way to the coast, or Capitola, looking for a cooler climate. They were driving over so as to have their teams with them. Their outfit included three two-horse surreys and a light two-horse provision or camp wagon. They all were out for a good time, and I can say right here they were having it.

Before retiring I thought I would look over the old steamer and see if I could find the cause of low steam pressure. The symptoms indicated something wrong with the water circulation. So I took a look at the cross head pump and found the packing box very loose, in fact, nearly off, as I turned it several times with my fingers. I knew at once that this was the cause of our trouble. I think my little three-year-old boy had something to do with loosening the box, for I saw him working with it before leaving home.

It was early when all retired, as the campers wanted to travel early in the morning while it was cool, and rest through the heat of day, resuming their journey in the cool of the evening. The only thing to disturb our slumbers that night was the melancholy staccato bark of coyotes; they seemed to be on a serenade,

or having a revival service, as one of the old ladies remarked.

Before the sun was up, all were ready to move, our friends expecting to go about 40 miles, while we wanted to reach San Juan, over 100 miles distant, and join the automobile run there the following day on the way from San Francisco to the tournament at Del Monte. The old steamer was herself again this morning, the hand on the steam gauge hanging around close to 200 lbs. and above that, no matter how wide the throttle was opened.

The roads were fine, too, considering the uninhabited country. The firm of Miller & Lux, the cattle kings, own nearly all the land between Merced and Los Banos, which they have turned into cattle ranges, and for miles there is not a house in sight. Jack rabbits and squirrels are in abundance, however; they could be seen scampering in every direction. The little ground owls were conspicuous also, bobbing and teetering, seeming to twist their heads off watching us as we flew along. A band of cattle got ahead of us and kept us back some time. They would not get out of the road, and though they ran, they could not move along as fast as the auto. They made such a dust that at last we had to stop and let them go ahead and gradually work out of the road themselves.

At Dickenson ferry, a bridge across the San Joaquin, we replenished our water tank with mineral water that flows from an artesian well. This water is anything but palatable, but is claimed to have great medicinal properties. There is one house at the bridge kept by a Portuguese. It is a wayside inn; they have a bar, give meals and stable horses.

Eight o'clock found us in Los Banos, a thriving little town of about six hundred inhabitants, I should judge, the population seeming to consist of a great many Italians, Mexicans and Portuguese. It is a business-like looking place and has one of the finest hotels in San Joaquin Valley. We again replenished our gasoline tank here, so as to have plenty to take us over the mountains to Hollister. We went to the Miller & Lux store, where they always keep an abundance of the fluid. Nearly the whole population was around us before we left the town. The two gentlemen who own gasoline runabouts made themselves acquainted, told me about the roads ahead and asked concerning the flash boiler steamer of which they had heard so much. Like most all automobilists, they were partial to their own rigs.

Five miles out of Los Banos we came to Volta, a railroad station on the S. P. Just before entering the town we passed a man in a gasoline car, who, we were informed, was a telephone official going along the line.

About six miles out of Volta, while going at a twenty-mile clip over what seemed the smoothest road, I ran into a ditch about a foot deep and not much wider, and broke all the upper leaves in both my front springs. I never expected such a rut and was in it before I could slow down enough to go over easily. I had nothing with me to repair the damage, so proceeded slowly to the next place with the body resting on the front axle.

Ten A. M. found us at the famous San Luis Ranch, consisting of more than 80,000 acres of land. It is a fine old place built on the mission plan, surrounded by great cotton woods. It has always been a wayside place and there is never a night, especially through the spring and summer months, that this place is not crowded with travelers from Merced, Fresno and southern towns on their way to the sea coast, and coast inhabitants going to Yosemite Valley. This day was no exception. Several tents were spread among the trees, and many people were waiting for the noon meal. A nice family keeps the house, and travelers are always well taken care of. Meals are but 35 cents, and lodging 50 cents.

One cannot remain around the old place long without thinking of Ramona, if they have ever read that book. It seems the writer of it had just such surroundings when she gathered her material for that pretty story.

Immediately on arriving I commenced work on my two front springs. It is useless to state that I did not want for assistance, I had the whole camp, and more than once had to beg the Gastons and Alphonses to let me have my way about things. I was just going to wire strips of iron on both sides of the springs when I saw a long piece of burlap on the ground. I asked if I might use it, and being informed that I might, cut it into strips about seven inches wide, rolled them in rolls about six inches in diameter and put one between the upper and lower part of each spring. I then strapped the springs together to keep them from jolting apart and letting the rolls fall out. I intended to get new springs at Hollister or get the old ones repaired, but these bumpers worked so well that I never took time to attend to them until reaching Santa Cruz.

After lunch we again started on our journey. Our first mountains were just before us. It was ten miles to the top of the summit or Mountain House, as the place is called. Half the distance is level as a floor; the other half is up-grade, but is good; in fact, it is the best mountain grade I have ever traveled over in the State. It will keep a little gasoline runabout on the low gear all the time to take the grade, and if you do not go very early in the morning when it is cool, the engine will heat and it will be necessary to stop and let it cool. I know this from my own experience, as well as from the experience of others. No water can be found for ten miles. Including two stops to let rigs pass, I made the run from the San Luis Ranch to the Mountain House in 48 minutes.

The Mountain House is another stopping place, hotel, bar and stable kept by a German. Water is scarce here. They usually keep the cover of the water trough locked and one must go to the bar for the key, and, of course, spend a dime or two. This is one of the ways to get you to patronize the bar.

We now had twelve miles down grade to Bell Station. The grade is not so steep, but the road is bad, entirely different from the other side. While going down this grade in 1902, I met Mr. Hickerbottom, of San Jose, in his runabout. He was out hunting and had just killed two deer. They are abundant in these parts.

Near where we passed Mr. Hickerbottom we came on to a run about in the hottest place, I think, on the mountain side. There were two men near it; one sitting on the edge of the grade apparently in deep meditation—no doubt thinking of other ways of traveling than the auto—while the other was looking for trouble about the auto. Both had oily instruction books in their hands. Our steamer made so little noise we were on to them before they were aware of us, and so near when I sounded the horn, it startled them.

I knew they were in trouble before they told me. Automobilists do not stop in such queer places unless they are. There was scarcely room to pass, so I backed my carriage up hill under a shade tree and went to see what I could do for them. They had been there several hours and tried everything they knew of to get power out of the engine, but could not.

She would run nicely until the clutches were thrown in and then she would stop. They thought this was caused from friction somewhere and had the transmission apart, and, in fact, nearly everything else. They were just opening the engine case when I arrived. When they told me their troubles, I immediately thought of my first effort to go into the mountains and how the vibrator had shaken loose, causing just such symptoms.

They said the machine was running fine in the morning from Bell Station, and had become weaker and weaker until it stopped. The engine did not skip or miss, but was just weak. I told them what I thought the trouble was, so they put the parts together, while I went to my carriage for something for them to drink. They were almost famished, being in the sun several hours, and were waiting for a team to pass going down, to pull them to Bell Station. It is useless to say that a little ginger ale highball tasted good to men in their predicament. They had the highball with them, but not the ginger ale.

(To be Continued.)

A Reading (England) liveryman states in his petition for bankruptcy that the introduction of street railways and the popularity of automobiles ruined his business.

New Vehicles and Parts

The Oldsmobile Touring Car.

After confining themselves for three seasons to the familiar curved dash, 4 to 5-h.p. runabout, the Olds Motor Works, of Detroit, Mich., have this season brought out, in addition, a runabout of somewhat greater power, called a touring runabout, and a tonneau-body touring car. The company have experimented for a number of years on a four-passenger car embodying the general mechanical features of their runabout, but it was only this year that a design was produced which, by reason of its pleasing form and its roomy and comfortable seats, bids fair to rival the runabout in popularity. Comparing the mechanical design of the touring car with that of the runabout one observes many points of similarity and at the same time many differences of detail. A careful study of the two cars creates the impression that in the design of the tonneau the designer used the runabout as a model, and wherever changes were made it was either to avoid some weakness known to exist in the runabout design or to meet conditions imposed by the use of a tonneau in place of a runabout body. Thus, one frequent source of trouble in the runabout of earlier seasons was the cylinder-head gasket, which has been done away with in the touring car engine by casting cylinder and head integral. This change has necessitated the further change of making cylinder and crank chamber separate and bolting them together. Another weakness in the earliet runabout engines resided in the fact that the studs by which the caps over the crank shaft bearings were secured were liable to break. This difficulty has been overcome in the new engine in a most interesting manner, as will be fully described. In the runabout the valves are located in the rear part of the body and are reached by raising the rear door, but as in the tonneau it would be difficult to get at the valves if located in the same position, the engine has been reversed, the cylinder extending forward from the crank shaft, which brings the valves and spark plug directly below the foot board, where they can be reached by raising this board.

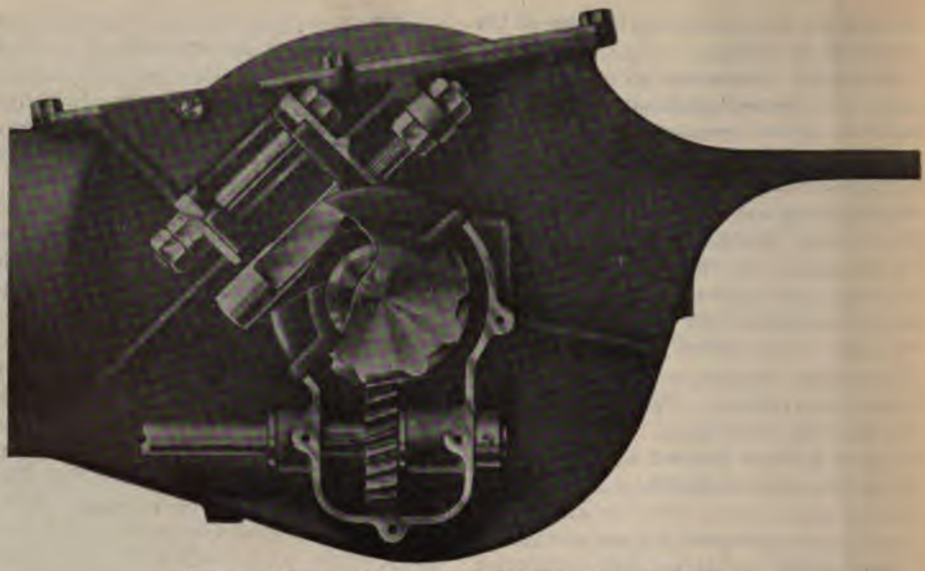


Fig. 2—Method of Holding Bearing Cap in Place.

The engine is a single cylinder, horizontal one of 5½ inches bore and 6 inches stroke, and is rated at 10 h.p. As already stated, the cylinder is cast integral with the head, which contains the valve chamber. The crank case is also cast in one part and is bolted to the cylinder by means of a flanged joint. Contrary to customary practice, this joint is not at the extreme end of the cylinder casting, but a certain distance back from the end, the cylinder telescoping into the crank case casting. The arrangement of the joint is plainly shown in Fig. 4. The valves are arranged with their stems vertical, the same as in the runabout engine, but the valve chamber, instead of being closed by a single plate, is closed by two plugs, one over each valve. The cylinder jacket is cast with a large opening on either side, which is closed with a sheet metal plate.

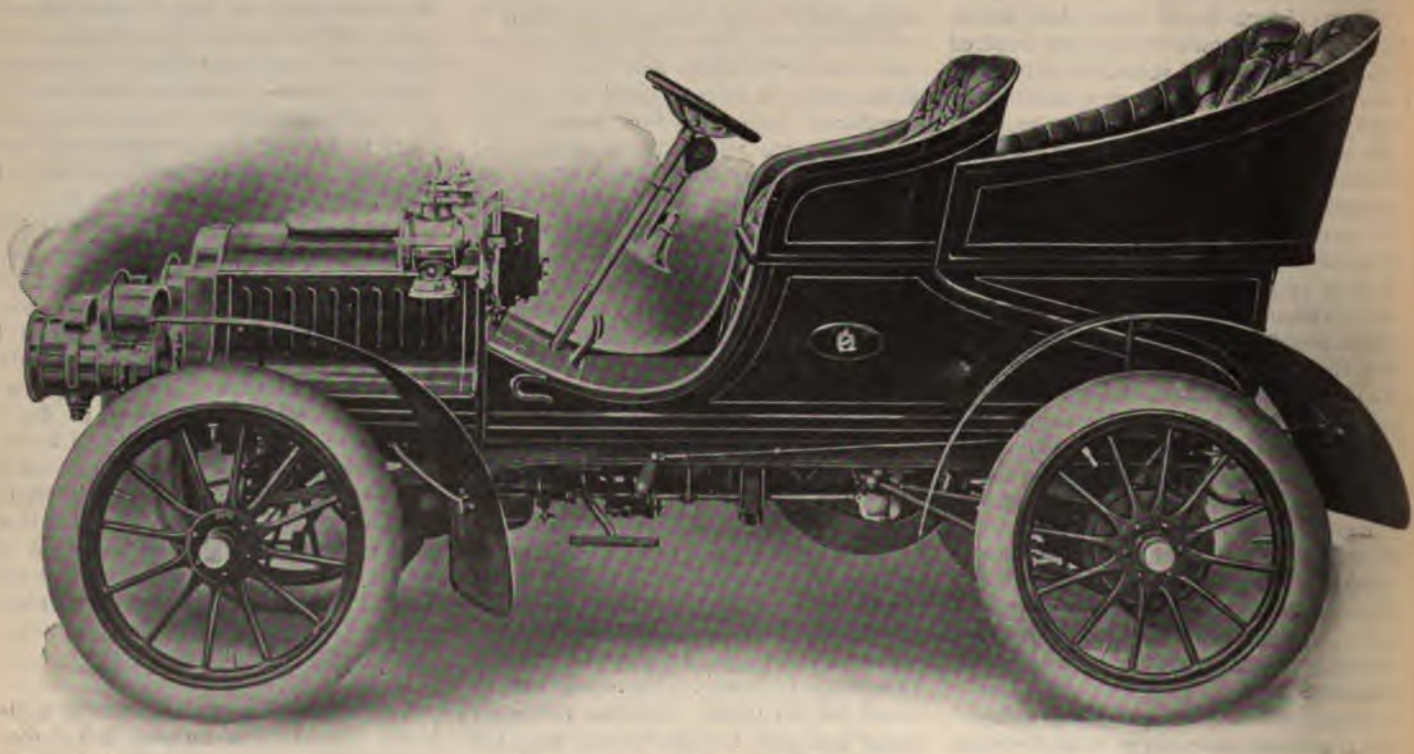


Fig. 1—Oldsmobile Touring Car.

The crank chamber is also made in one casting, an opening in the top for inspecting the connecting rod bearing being closed by an aluminum cover plate. The case is cast with a deep slot, at an agle of 45 deg., in either side wall, through which the crank shaft is introduced. The crank shaft is a drop forging and the crank arms are provided with counter weights for balancing purposes. The crank arm on the flywheel and driving side is made considerably wider than the other one, as it has to bear much greater strains. On the left-hand side of the engine (looking in the direction of the car) the crank shaft extends through the bearing just far enough to receive the spiral pinion for operating the cam shaft. This pinion and its gear are plainly shown in Fig. 2 and also in Fig. 6. They are completely enclosed in a dust-proof casing with removable head and operate in oil. The opposite end of the crank shaft extends all the way across the vehicle frame, carrying the flywheel, the change speed gear and driving sprocket pinion, and being supported at its outer end in a bearing formed in a bracket bolted to the running gear frame. All the bearings of the crank shaft are lined with Babbitt metal. The crank shaft bearings are 2 inches in diameter and the crank pin bearing is 2⅛ inches.

The cam shaft runs parallel with the cylinder and is supported in two bearings at the crank end, formed in the casing enclosing the cam shaft gears; and in an additional bearing at the head end, formed in a bracket extending from the cylinder casting. The cam shaft carries between its bearings the ignition circuit breaker and in front of its head end bearing the two steel cams for operating the inlet and exhaust valves, respectively, both of these valves being operated positively. The operation of the valves

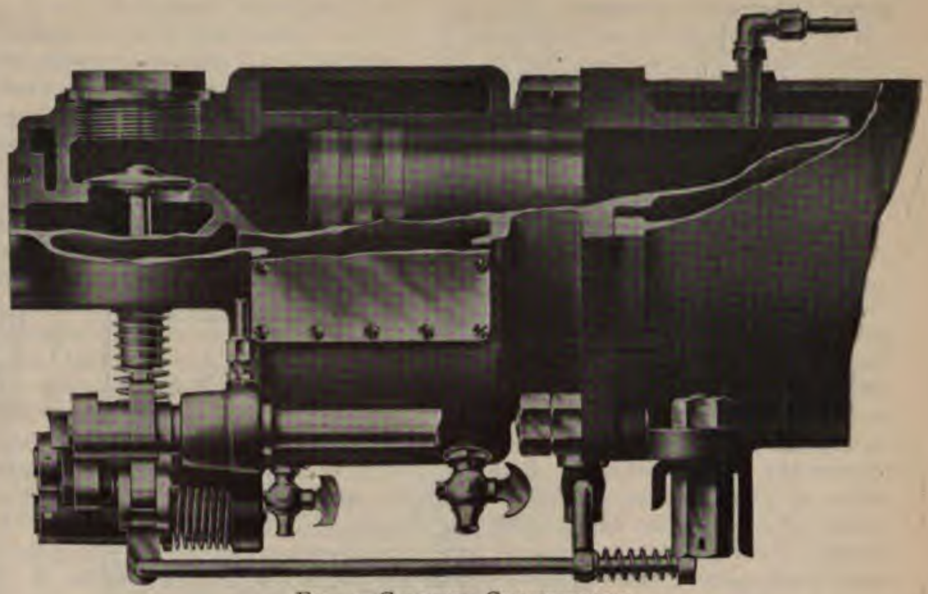


FIG. 4—CYLINDER CONSTRUCTION.

is effected through the intermediary of rocking levers provided with cam rollers, in substantially the same manner as in the runabout engine. The rocking lever for operating the exhaust valve is arranged to allow it to be drawn along its pivot shaft against the pressure of a coiled spring, by means of a safety starting lever, as will be explained further on. This operation brings the cam roller on the exhaust valve rocker arm into operative relation with a special cam, which causes the valve to remain open during part of the compression stroke. The result is that a certain amount of the charge drawn in during the suction stroke escapes through the open valve during the first part of the compression stroke, thus relieving the compression and allowing the motor to be started by hand without great effort. In Fig. 4 will be seen two cocks projecting from the lower part of the cylinder jacket. The one at the head end is the compression cock, and the one at the crank end serves to drain the jacket of water. The jacket is 11-16 inch deep, insuring a large body of cooling water around the cylinder.

Special attention should be called to the method of holding in place the caps for the crank shaft bearings, and of adjusting these bearings for wear. One cap is cast integral with a part of the cam shaft gear casing. Flanges are cast on the crank casing on either side of the 45-deg. slot, above referred to. These flanges are slotted and drilled, respectively, to receive a tapering bolt or wedge, which can be adjusted by means of nuts, to draw it tight on the crank bearing cover and clamp the latter securely in position. The slots cast in the crank case are closed by cast iron plates

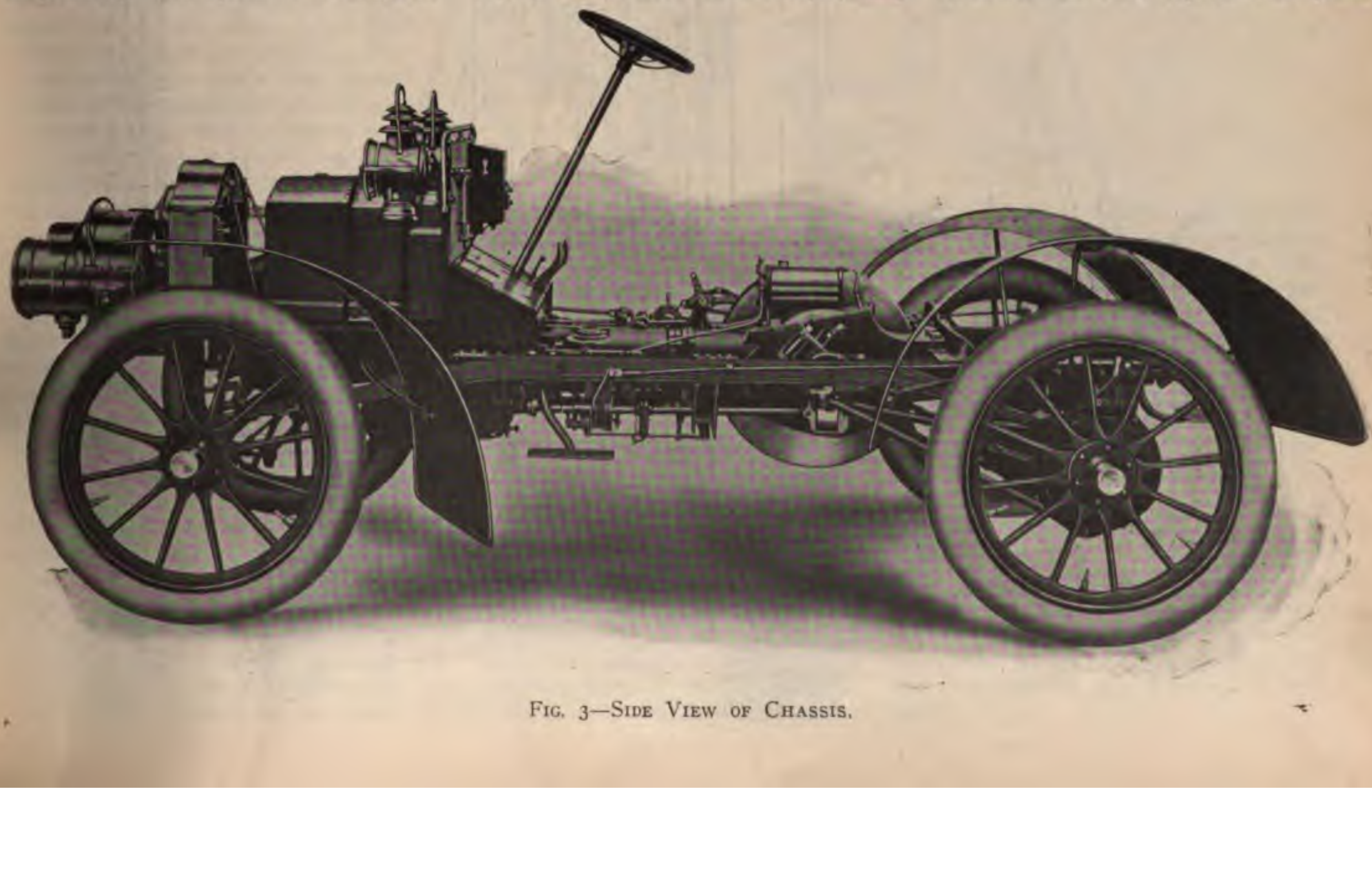


FIG. 3—SIDE VIEW OF CHASSIS.

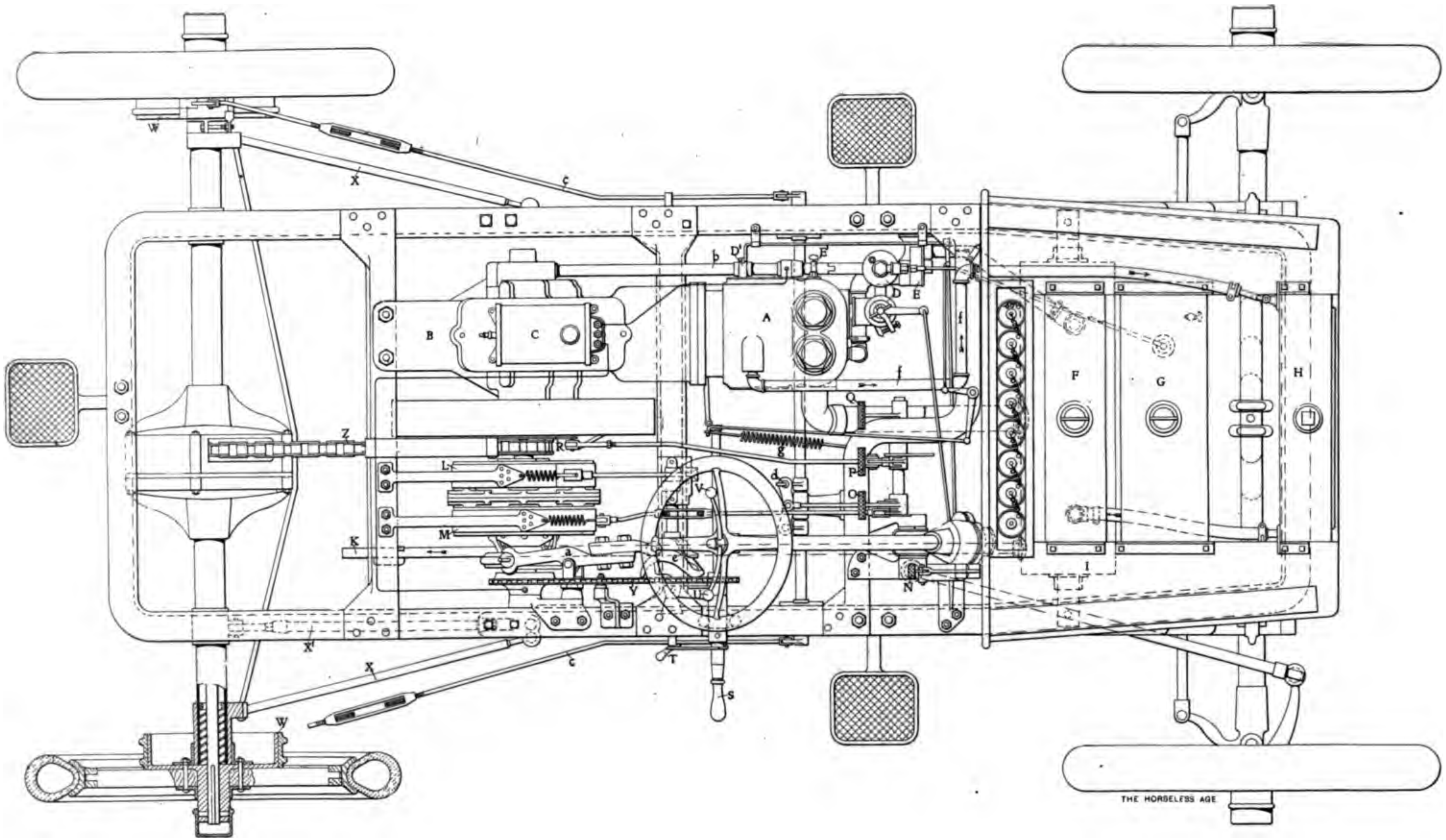


FIG. 5.—PLAN VIEW OF CHASSIS.

A, engine cylinder; B, engine crank case; C, automatic lubricator; D, carburetor; D^1, circuit breaker; E, circulation pump; E^1, spark plug; F, water tank; G, gasoline tank; H, honeycomb radiator; I, muffler; J, exhaust pipe; K, muffler discharge pipe; L, slow speed drum and brake; M, reverse drum and brake; N, pedal controlling lock on tilting steering column; O, wheel-brake pedal; P, transmission brake pedal; Q, reversing pedal; R, transmission brake; S, starting crank; T, safety starting sector; U, spark lever; V, throttle lever; W W, rear wheel brakes; X X, brake thrust rods; X^1, distance rod for chain adjustment; Y, motor starting chain; Z, driving chain; *a*, high speed clutch lever; *b*, cam shaft; *c c*, rear wheel brake rods; *d*, brake tension equalizing lever; *e*, high speed clutch operating cam; *f*, water return pipe from jacket; *g*, automatic safety starting sector return spring.

held in position by a special bolt, as shown in Fig. 2.

The engine is lubricated by means of a pressure-operated, sight-feed lubricator with three feeds, located on top of the crank case. It is operated by the compression in the crank case during the outward stroke of the piston, being in communication with the crank chamber through a small tube containing a check valve. One of the feeds leads to the head-end bearing of the cam shaft and is adjusted to feed one or two drops a minute; a second feed supplies the cylinder, and is adjusted to feed three to four drops per minute, while the third feed supplies the outboard crank shaft bearing and is adjusted to supply one to two drops per minute. The adjustment of these feeds must, of course, be made while the engine is in operation.

A float feed carburetor is used and is located just in front of the cylinder head, where it is very accessible for inspection by removing the foot board, and easy of connection to the throttle operating lever on the steering post. The gasoline tank, which holds 7 gallons, is located under the bonnet immediately back of the combined radiator and water tank. A copper tube leads from the bottom of the gasoline tank to the float chamber of the carburetor, the connection being short and direct. The main water tank (7 gallons capacity) is also located under the bonnet. The filling caps of both tanks extend through the top of the bonnet, and it is therefore not necessary to raise the bonnet to fill either of the tanks.

The engine is, of course, water cooled, the cooling system comprising a cellular radiator, a tank and a circulating pump, the latter being of the gear type and arranged at the extreme end of the cam shaft. The pump draws its supply from the main tank and forces it into the cylinder jacket at the bottom. From the top of the jacket the water flows to the radiator, and from the latter it returns to the tank. Drain cocks are provided at the lowest point of both the pump and the jacket, thus permitting the operator to completely drain the water system when storing his car in cold weather, to prevent damage to the engine from freezing.

Ignition is by jump spark, the same as in the runabout engine, and comparatively few changes have been made in this part of the power system. While in the old engine the spark plug was screwed into the plate over the valve box, in this engine it is screwed into the wall of the valve chamber, at the side. The current is supplied from two dry batteries of four cells each. These are arranged in a moisture proof sheet metal casing secured to the front side of the dash board. The spark coil (of the vibrator type) is secured to the rear side of the dash board being put up in a hard wood box. A double throw switch on the coil box allows of readily changing from one battery to the other. The circuit breaker is carried on the cam shaft, as in the runabout engine, but is better protected from dirt and moisture. It is of the brush or wipe-contact type and is insulated with hard rubber.

The engine is supported on two cross members of the frame. The crank case is cast with a forwardly-extending foot, reaching beyond the rim of the flywheel and resting on one of the frame cross members, and the other cross member passes underneath and supports the rear part of the crank case.

The change speed gear, although also a planetary device, is of entirely different design from that employed on the runabout. Referring to Fig. 6 to the driving shaft A is keyed (by means of a Woodruff key) a double driving pinion B C. The pinion B meshes with planetaries D, which are also in mesh with gear teeth in the low-speed internal E, and pinion C is in mesh with planetaries F, also meshing with the reverse internal G. The low-speed planetary pinions D are carried on the low-speed spider H, which is keyed to the hub of the sprocket pinion I, and the reversing pinions are carried on the reverse plate J, which is keyed to the reversing drum K. The drum of the low-speed internal E and the reverse drum K are encircled by steel brake bands by means of which they may be held from rotation. The gear case enclosing the pinions is completed by a drum L, which is bolted to the low-speed internal E.

It will readily be seen that when the brake is applied to the low-speed internal E and the latter is held from rotation, the driving pinion B will cause the planetaries D to roll on the low-speed internal E, thereby rotating the low-speed spider H and the driving sprocket I at a relatively slow speed —three-eighths of that of the driving shaft A. In order to reverse the motion of the car, a band is applied to the reverse drum K, thereby holding that drum and the reverse plate J stationary. The driving pinion C now causes the reverse pinions F to rotate on their stationary studs, thereby driving the reversing internal G in the opposite direction; but G is directly connected to the slow-speed spider H by means of the studs for the slow-speed pinions, and therefore also to the driving sprocket I; consequently, by applying the brake to drum K, the driving sprocket I is turned in the reverse direction.

To obtain the high speed forward the entire gear is locked together by means of the usual high-speed friction clutch. The construction of this clutch is materially different from that of the corresponding device used on the runabout. It is essentially a disc clutch, the reverse plate J and reverse drum K forming together one of its members and the gear drum L the other member. By means of the usual clutch dogs M and the sliding collar N, these three discs are firmly pressed together laterally, with the result that the entire gear is locked and the driving sprocket I rigidly secured to the driving shaft A. The power is then transmitted direct from the engine shaft to the rear axle. The clutch dogs E are pivoted on a spider O threaded over the hub of the reverse plate J and held in position by a set screw. By means of this threaded spider the clutch can readily be adjusted for wear. It will be noticed from the drawing that the working face of the clutch member K is lined with friction material.

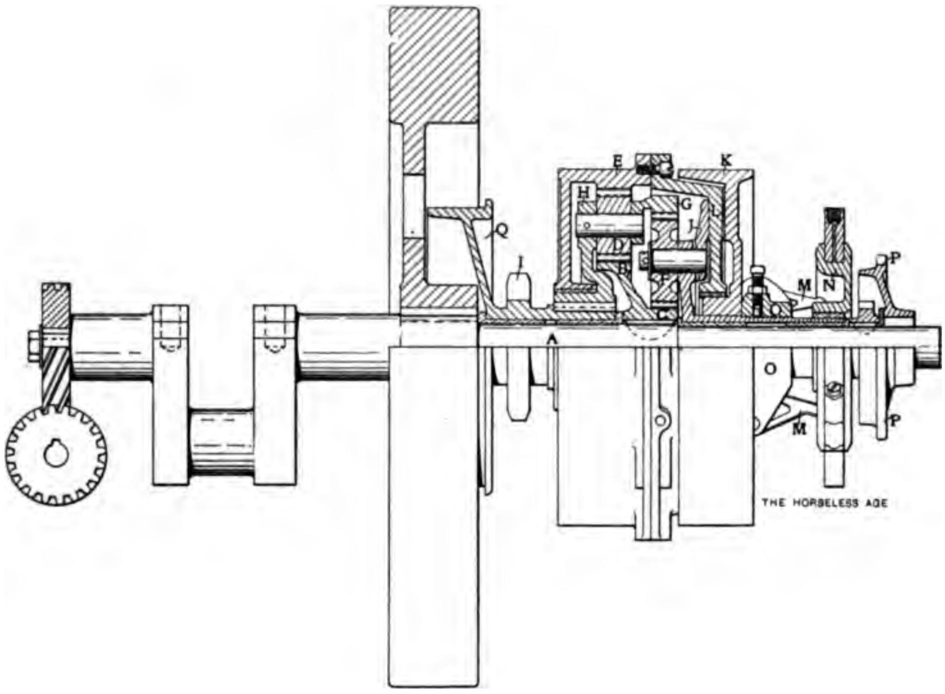


Fig. 6.—Crank Shaft and Change Speed Gear.

The central driving pinions of the change speed gear are drop-forged steel, and the planetary pinions, four in number for each set, are of bronze. All pinions are of 8 pitch, those for the reverse having a ¾-inch face and those for slow speed a face of 1 inch.

To the end of the crank shaft A is secured a small sprocket wheel P by means of which the engine is started, a drive chain connecting this sprocket with another on the starting shaft, to which the detachable starting crank is applied. The driving sprocket I is formed integral with the transmission brake drum Q located inside the flywheel. As there are no sliding joints in the casing of the change speed gear at the outer periphery, the gear may be operated in oil. The oil is introduced through an opening in the outer shell of the case, which is closed by a screw plug.

The change speed gear, instead of being operated by a single lever, as in the runabout, is operated by one hand lever and one pedal. When stopping or standing, the lever is thrown backward as far as it will go, so that in starting the vehicle, after the motor has been started, this lever can be thrown forward into slow speed and then into high speed. Slow speed position may be noticed by a point where the lever goes hard and "sets" in place.

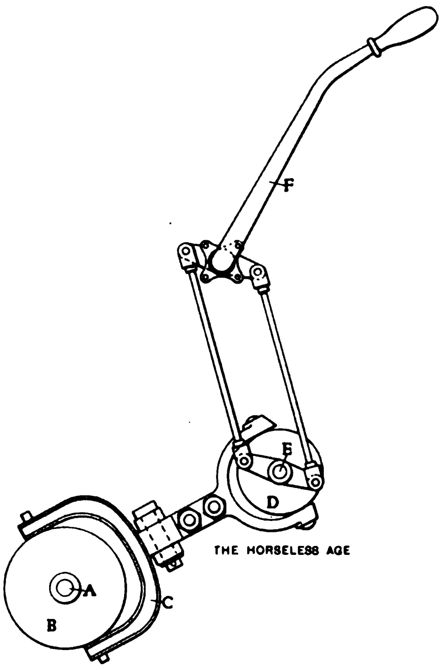


Fig. 7.—Clutch Operating Mechanism.

A, engine crankshaft; B, clutch sliding collar; C, clutch lever (fork); D, grooved cam for operating clutch; E, cam shaft; F, gear lever.

From the shaft of the gear operating lever the motion is transmitted, without reduction or amplification, to a cam shaft located below it, by means of identical double-armed levers on both shafts and two links connecting them. The cam shaft carries a large specially shaped cam with a cam groove. The cam is symmetrical on both sides and serves to operate the high speed clutch through the intermediary of a forked shipper lever in engagement with the grooved sliding collar N. in Fig. 6. The cam shaft at its inner end carries a second cam for operating the low speed gear. This cam *serves to apply* the brake band to the low speed drum through the intermediary of a lever and an adjustable rod. The gear operating mechanism is self-locking, so that when either the high or low gear has been engaged, there is no tendency for them to release themselves, and the change speed lever does not therefore require a notched quadrant. The reverse gear is operated by means of a pedal. One end of the brake bands acting on the transmission drums is fixedly anchored to the frame of the car.

The driving sprocket is cut with either eight or nine teeth, and the sprocket wheel on the differential has twenty-nine teeth. At the normal speed of the engine, 700 r.p.m., the car is calculated to give a speed of 20 m.p.h. on the high gear, 7½ m.p.h. on the low gear, and 6 m.p.h. on the reverse. The transmission to the rear axle is by a 1¼ inch pitch roller chain.

The frame is constructed of 2¼ x 2¼-inch angle steel, and is supported on side springs two inches wide. Only the two lower leaves of the springs run the entire distance from the front to the rear axle, the other leaves being cut away at the middle portion, where the spring runs parallel with the frame side member, and replaced by wood fillers, in such manner as to convey the impression of continuity of the springs. In addition to the two side springs, an inverted elliptic or X spring is placed between the front axle and the forward end of the body. An improvement has been made in the manner of connecting the body frame with the rear axle. The ends of the springs are simply passed through spring brackets on the rear axle, and a distance rod is provided between the frame and axle at either side, having a forked connection with the axle housing and a ball and socket connecting with the frame. This admits of keeping the chain tension uniform and avoids undue strain on the chain. The distance rods are located immediately below the side springs.

The car has a wheel base of 82 inches and a tread of 55 inches. The road wheels are of the artillery type, 30 inches in diameter and fitted with 3½-inch detachable tires. The front axle is tubular and trussed, and provided with forked axle ends and corresponding steering knuckles. The rear axle is a live axle with a bevel differential gear near the center. The hubs of the rear wheels are formed with brake drums, and band brakes are provided to act on these brake drums and are operated by a pedal through a compensating mechanism.

The car is steered by means of a hand wheel on top of an inclined column which may be tilted forward and back around the shaft of the worm gear through which the steering wheels are operated. The steering column is locked in position by means of a springed latch which can be unlocked by means of a small pedal to the right of the column. The worm and sector of the steering mechanism are enclosed.

While in the small Olds runabout the engine speed is controlled by the foot, the engine being throttled down by a spring and speeded up by pressing a pedal extending this spring, the control of the engine on the tonneau car is entirely by hand, the throttle lever being located on the steering wheel, the same as the spark lever. There are three pedals on the floor of the car to the left of the steering wheel. Of these three, the one on the right operates the band brakes on the rear wheels; the one in the middle operates the transmission brake, and the one on the left is the reverse pedal.

For starting, the spark and throttle levers are turned around to the limit of their motion toward the operator, when the spark is set late and the throttle nearly closed. A safety device for starting is provided, which at the same time reduces the effort required to start by hand and prevents all possibility of backfiring. The starting crank is detachable and is applied to a starting shaft under the seat, being introduced through an opening in the seat panel at the right hand side. This starting shaft connects with the engine cam shaft by a chain. To prevent the engine being started while the spark is set early, the opening through which the starting crank is introduced is normally closed by a pivoted sector held in position by a spring. Before the starting crank can be inserted this sector must be swung aside, and as it is connected to both the compression release device and the ignition circuit breaker, this operation automatically sets the spark late and puts the compression release into operation. The engine is started from the ground, and not from the seat, as in the runabout.

The dashboard is separate from the body, which allows the latter to be removed after loosening only four bolts. The bonnet is removable and is made of sheet steel with brass trimmings. The car complete weighs about 1,900 lbs. and is finished in dark green or dark red. The equipment comprises a set of tools, horn, mud guards and a pair of oil brass side lamps.

Resilient Core for Clincher Tires.

A tire core, intended to be slipped into the outer cover of a detachable pneumatic tire, to replace an air tube, has been produced by Charles Miller, of 309 North Water street, Binghamton, N. Y. The interior of the core is divided into cells by one central longitudinal and a large number of transverse partition walls or diaphragms. In case the outer cover is punctured or otherwise seriously damaged, one of these cores can be slipped into it, and the fact that the tire will not hold any air will not then prevent the car from being operated.

The British Consul in Rome, Italy, writes to his Government that it might be advantageous for British manufacturers to establish in Rome supply depots for parts and tires, as the cars in use are increasing.

MAINTENANCE AND REPAIRS

Care of Tires.

It is apparent that great harm can be done to the tires through careless and inconsiderate driving. The effects of sudden starting and stopping have already been discussed in a previous article, in showing the influence of imperfect action of the brakes and clutch. But even with the most perfect braking and clutching mechanisms much unnecessary deterioration of the tires may be caused by lack of care in operation. The operator should always try to avoid the shocks of a sudden start or a quick stop to save not only the tires, but other parts of the car as well. The tires are usually the yielding members which absorb the greater part of these shocks, and are therefore the greatest sufferers. If the coefficient of friction between the wheel and the ground is sufficient to keep them from "skidding," they are submitted to tremendous strains tending to tear apart the rubber and the fabric in the outer shoe. If skidding occurs the wear on the tread is dependent upon the condition of the road surface. In ordinary operation a single violent stop or start does not ruin the tire, but each one weakens the outer structure of the cover to an extent and hastens the end of the tire's usefulness.

The tires are also subject to unusual strains in turning at speed, the side strains thus created tending to tear them from the rim and to "skid" them sidewise over the road, both of which actions are, of course, detrimental.

An important cause of wear on the tires of cars that are frequently stopped in the course of a run—a doctor's car, for instance—is the rubbing of the wheel against the curbing. This will wear off the outer covering of rubber at the point of contact, and allow water to get at and rot the canvas beneath. In such cases there is also greater danger of bending the rim in places, in such a manner that it will pinch the shoulder of the shoe and possibly cut into it.

EFFECT OF SHARP STONES.

Running over roads covered with small, sharp stones is very detrimental to tires, and small bits are almost sure to be cut from the projecting coating of rubber, and in some cases the covering may be cut through to the fabric. It is largely due to such causes that "blisters" appear on outer shoes. The only effective cure for them is re-vulcanization, and as this is a relatively expensive operation, the prevention deserves every consideration.

It is safe to say that more tires have been hopelessly ruined by driving that "last mile" while they were in a deflated condition, due to a puncture, than have been by punctures themselves. The fabric may be torn from the rubber, the shoulders torn at the bolts, and the valve stem pulled out of the inner tube. It is far better, if it really is impossible to repair the tire on the road, either through lack of time or of the proper tools and appliances, to remove the tire completely from the rim and to drive slowly and carefully in this manner to the nearest harbor of refuge. There are records of many miles traveled with a piece of rope serving the purpose of a tire, but the advisability of attempting such "makeshift" measures depends entirely upon the conditions peculiar to the case, and cannot therefore be discussed in a general way.

STEERING WHEEL TIRES.

A large proportion of drivers bring much unnecessary wear upon the tires of the steering wheels by twisting the wheels about before the car has been started. Tremendous strains are thus brought upon the steering mechanism, the tires are ground into the road surface, and the outer covering of rubber is worn off to a greater or less extent. Ordinarily a sufficiently sharp turn can be made by turning the wheels as the car starts to move, and turning them while the car is stationary is entirely unnecessary. The grinding, if it does occur, is then distributed over a larger section of the tire, and its evil effects are accordingly reduced.

CARE OF SPARE TIRES.

Proper treatment is as essential in the case of spare tubes as in that of the tires in actual use, as when the extra tubes are needed they must be in perfect condition. It often happens that spare tubes are carried about for a considerable time before being put on the wheels, and during this period they must be protected against all deteriorating influences.

Rubber deteriorates from various causes. Light, heat and oil all have a destructive effect on it, and, besides, it is, of course, subject to mechanical injury. To put an inner tube uncovered into a box full of loose tools, oil cans, etc., is only a little better than throwing it away. The tools will chafe and the oil rot it, so that if it holds air at all when inflated it may soon burst under the weight of the car.

Extra inner tubes, to be carried safely, should be first rubbed well all over with French chalk and folded carefully and tied —not too tightly—with wide tape. They should then be placed in a bag made of soft, water and light-proof material which has also been carefully dusted inside with French chalk. This bag should then be carried in some part of the car where it will not be subjected to heat or come in contact with oil. The French chalk will prevent chafing between different parts of the tube and between the tube and the bag. If string is used to tie the tube it is likely, if drawn sufficiently tight, to hold the folds together so that there can be no rubbing between them to cut into the rubber and stretch it considerably at one point, with injurious results. After a tube has been carried a reasonable length of time, it is well to refold it so that the creases will come in new places. A spare tube deteriorates most quickly at the sharp bends caused by the folds.

EXTRA OUTER SHOES.

Extra outer shoes, if not carried on the car, should be stored where they are not open to the attacks of the enemies of rubber and fabric—light, heat and dampness. If carried on a car, it becomes necessary to keep them covered in some way, so that they may be protected against all of these and against dust and chafing as well. There are now on the market covers specially made for this purpose. It is possible to obtain very good results from a winding of rubber cloth, but the cover will be found much more satisfactory, all things considered, particularly in point of appearance.

New Motor-Truck Law in England.

The regulations of the Local Government Board controlling the speed, weight, width of tires, etc., of heavy motor-cars and lorries have now been framed. They are practically based on the recent report of the Departmental Committee, and it is expected that little opposition will be made by local authorities and that they will be passed substantially as drawn up by the end of the present month.

It is laid down that the speed of metal-tired vehicles must not exceed eight miles per hour, with a reduction to five miles if the unloaded weight exceeds three tons and a trailer is drawn or the axle weight is over six tons. Non-metallic tired vehicles between three and six tons in weight may travel at twelve miles per hour; over six tons it is reduced to eight miles. No motor wagon over three tons in weight, unladen, used as a stage carriage or for the conveyance of passengers, will be permitted to draw a trailer. The regulations will be enforced after six months' grace for adapting old cars.

In the British Army manoeuvres in Essex this month officers on duty will be permitted to use their private motor cars for military purposes. An allowance will be made for the use of them. If four persons on duty are carried in a car 6d. per mile will be allowed; for three or less, 3d.; for every person above four, 1d. For motor cycles the allowance will be 1½d. a mile per cycle. A "stabling" allowance of 2s. 6d. per car and 1s. per bicycle will be granted when a motor vehicle is absent from its station on duty. Soldiers using motor cycles will be allowed the officers' rates.

The Differential Gear.

By Julian C. Chase.

It is somewhat remarkable that practically no important improvement has been made in the design of differential gears during all the time they have been employed on self-propelled vehicles, especially when it is considered that the devices now used are far from being free from objectionable features. Many attempts have been made to devise ways and means to make a differential unnecessary, but none of them has been successful. The objectionable features here referred to do not consist in structural weaknesses, but depend upon the fact that a differential, besides providing the necessary differential action when the car is moving in a curve, also permits of certain other actions which are not desired, and may for this reason be considered defective when applied to automobiles. The objectionable features of the present-day differential are essentially two, to wit:

1. Its dependence upon a good road surface under each driving wheel in order to assure the starting of the car.

2. Its tendency to cause skidding.

The construction of motor vehicles for heavy commercial work has drawn attention to these defects, and a closer study into the causes of certain undesirable and at times, dangerous actions of the pleasure car under certain conditions will undoubtedly bring them out more clearly. The problem has already been taken up by the builders of heavy trucks, with a view to correcting the first of these defects, and the builders of the pleasure car will undoubtedly sooner or later direct their attention to the latter.

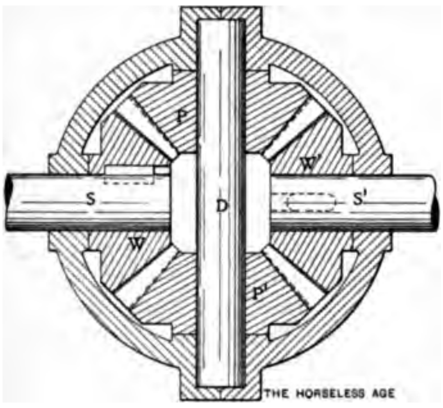


Fig. 1.

The transmission systems employed today to deliver driving power to the road wheels may be divided into two classes: (1) Those in which only one source of mechanical power is employed, and (2) those in which a separate source is employed for each driving wheel. In vehicles employing the first of these systems of transmission the differential gear is essential. In the second the differential action is provided by the elasticity, so called, in the source of power.

The first of these classes is much the larger, comprising, as it does, all vehicles driven by gasoline motors, all those driven by steam engines (with the exception of a few in which a separate engine is coupled to each driving wheel), and a few of those propelled by electric motors. The second class comprises nearly all vehicles driven by electric motors, it being common practice to-day to employ one motor for each driving wheel.

TWO KINDS OF DIFFERENTIALS.

In the first mentioned type of transmission the necessary differential action is supplied by a group of gears so arranged that while transmitting a steady driving motion to the road wheels they permit one of these to travel faster than the other when the car is turning. This group of gears may be of either the bevel gear or the spur gear type. In order to more intelligently enter into a discussion of the relative merits of these two types from a mechanical point of view, a brief description of each may be helpful.

Fig. 1 shows the general arrangement of the bevel group. S and S′ represent the driving shafts, to which, at their outer ends, are connected—either directly or by chains or gears—the driving wheels (not shown). Fastened securely to the inner ends of each is a bevel gear (W and W′) and meshing into each of these are bevel pinions (P and P′) which revolve under the differential action about the driving pin D as an axis. The driving power is applied to the ends of this pin in such a manner that it is revolved about its longitudinal center in a plane perpendicular to the driving shafts S and S′. So long as the resistance to movement at the outer ends of the two shafts is equal, the device will be auto-

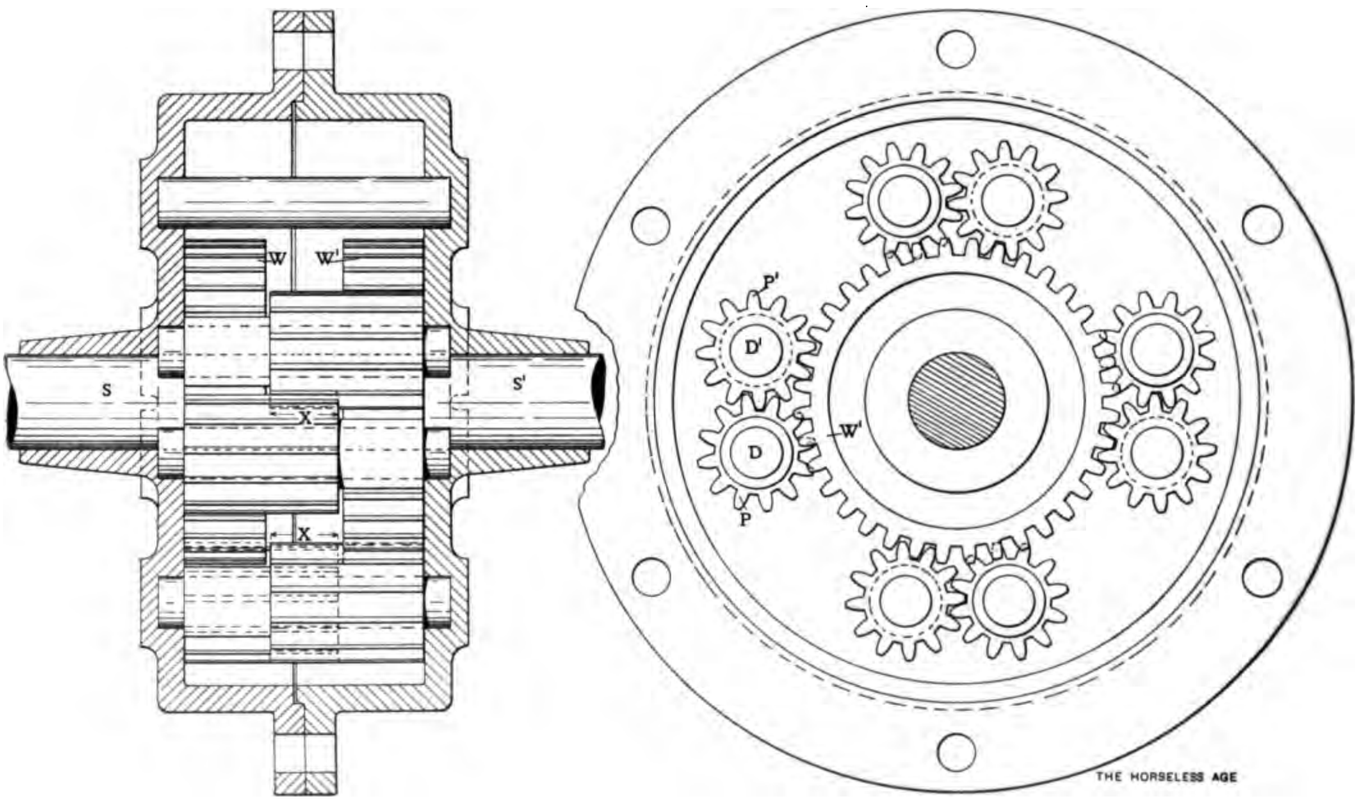


Fig. 2.

matically locked, and the two wheels driven at the same speed. When the resistance to movement is less at one end than it is at the other, the shaft on that side will revolve faster than its mate, and give to the pinions P P′ a rotary motion about pin D, and as a result the other shaft will travel at a slower speed.

THE SPUR DIFFERENTIAL.

In Fig. 2 is shown the arrangements of the gears in a spur gear differential. Here again, S and S′ denote the driving shafts, to the inner ends of which are attached spur gears, instead of bevels, the pinions which mesh into these being, of course, of the same type. The driving power in this case is applied to the ends of the driving pins D and D′, which move around the axis of the shafts S S′ at center. The tendency of the driving power is to revolve the pinions P and P′ bodily about the periphery of the gears secured to the shafts S and S′, and through the engagement of their teeth with those of the gears W and W′, to revolve them about the pins D and D′ as axes, but as these two pinions mesh together for part of their lengths (denoted by X in the sketch), and as the resultant directions of motion of their engaging teeth are directly opposite, they lock, and consequently a rotary motion is given to the shafts S and S′. If under the differential actions caused by turning the car from a direction in a straight line, the wheel attached to the shaft S′ tends to run faster than that attached to S, pinion P′ will be driven in the reverse direction about pin D, and it will in turn drive pinion P in the same drection as given to it by the driving power, which will cause the shaft S to run at a slower speed than that of the pins D D′ about the shaft center line.

BASIS OF COMPARISON.

With either the bevel or the spur type of differential, if one wheel is held fast the other will travel at a speed greater than that of the driving part (the case or frame), as it receives motion not only from this part, but also from the pinions. In discussing the relative mechanical merits of these two types of differential, the comparison should be made on the following points:

1. Strength.
2. Compactness.
3. Efficiency.

A glance at Figs. 1 and 2 will show that for each pair of pinions in the case of the bevel differential there are at least eight teeth in engagement to transmit the driving power, and that there is but one driving pin; and in the case of the spur differential there are but two engaging teeth (for the part of the pinion engaging at X in Fig. 2 must withstand the total driving power) and two driving pins. This means that so far as the teeth alone are concerned an equal number of pinions having equal faces and pitch would give four times the strength with the bevel group. In the matter of the driving pins, it may be said that with the multiplication of their number goes a proportionately greater demand for accurate workmanship and nicety of fits. The torque transmitted through the differential must be divided evenly between the pins and pinions, in order to derive any benefit from their increased number, and while it is at least theoretically possible to secure this condition when the parts are new and the gears operated under the most favorable conditions as regards twisting and bending strains which tend to disturb the natural arrangement, any unevenness of wear either in the gear teeth or in the pins themselves, or distortion due to strains and shock which must be withstood in practice, will tend to throw more of the strain of driving upon one pin than upon another, and thereby increase the liability of a break at that point.

STRAIN ON PINS.

The position of the pins is also a consideration of importance. In the case of the bevel differential, the pins take a radial position, and any tendency of the axle carrying the differential to sag in the middle will therefore have no effect upon them. In the spur gear type, on the other hand, the pins being parallel with the axle, a sagging of the latter will bring lateral strains upon them by throwing the gears attached to the ends of the driving shaft out of parallelism, wedging them diagonally between the two opposite sets of pinions. This difficulty can, of course, be avoided by attaching to the plate in which the driving pins are secured, long stiff sleeves through which the shafts may run, and by so constructing the group that the gears on the ends of the shafts will be held parallel with the inside of these plates by contact, but wear soon tends to render this corrective measure futile.

On the score of compactness the bevel group has again the advantage. The peculiarity of its construction, which provides a greater number of engaging teeth to divide the driving strain, makes it possible to employ gears with smaller faces, or a smaller number of gears with equal face, to transmit the same power. Further, the inside of the containing case for the bevel group need be but very little larger than the bevel wheels on the driving shafts, while in the other type space must be provided for the pinions to extend beyond these gears. It is, of course, desirable in either case to have the gears attached to the driving shafts as large in diameter as is consistent, so that the driving power is applied as far as possible from the center of the driving shaft, thus minimizing the pressure on the teeth.

It seems to be the best practice to enclose the bevel group in a strong spherical case and to employ but two pinions and one driving pin, which construction gives the greatest strength for a given weight and employs the fewest possible number of parts. It also makes the group self-contained as regards the end thrust from the gears. Originally this end thrust was taken up by the inside bearings at the end of the driving shafts, and a constant loss in driving power ensued.

RELATIVE EFFICIENCY.

To take up next the efficiency of the two types, it is at once apparent that the end thrust in the bevel group is very great, while in the spur gear type there is none at all. As both types are locked when both road wheels revolve at the same rate, the loss resulting from this end thrust in the bevel group occurs only when the car is running in a curve, which is the case only a comparatively small part of the time, and this loss can therefore be neglected in a practical consideration of the two systems.

Summing up, it would appear that the bevel gear differential offers the possibility of lighter weight for a given strength and greater compactness than does the spur gear type, while the latter has a slightly greater efficiency, which point is practically outweighed by the other two.

LOCATION OF DIFFERENTIAL.

The position of the differential group in the car is in practice determined largely by the general arrangement of the other essential parts. Theoretically, at least, there are advantages to be gained by placing it where it need transmit only a small torque and where it will be subjected to the fewest bending and sagging strains. However, when we note the performance of the many cars in which the differential is located in the middle of the driving axle—theoretically the worst position for it—we must admit that careful design and workmanship and a scientific selection of materials have virtually overcome in practice the objections found in theory.

An interesting fact in this connection, showing the difference of opinion among leading designers on this point, is that among firms who entered cars for the French eliminating trials for the Gordon Bennett cup race, two who use the side chain drive exclusively in their regular cars, employed the live axle on their cup racers, and another whose standard cars are regularly equipped with this latter type of drive employed side chains on its racing car. They were all, of course, striving to obtain the greatest strength throughout with the least possible weight.

RELIEVING SHAFT OF BENDING STRAINS.

A feature (shown in Fig. 3) of a well-known live axle car, which is worthy of special mention in this connection, is the location of the bearings of the rear driving wheels upon the ends of the tubes or sleeves through which the driving shafts run, and the driving of these wheels by fingers forged on to the ends of the shafts, which engage in notches cut in the outside face of the wheel hubs. When the road wheel is attached directly to the shaft from the differential, any wear or looseness in the out-

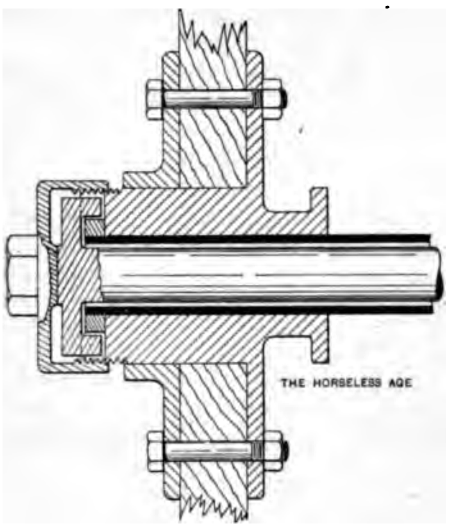


FIG. 3.

side bearing in the sleeve near the hub will tend to increase the sagging strain upon the outside case containing the differential and driving gears, and removes all possibility of any such strains being transmitted to the differential group.

Fig. 4 shows an arrangement which, besides the feature noted above, has the additional advantage of reducing the torque to be transmitted by the differential group. Owing to the fact that a further reduction is provided after the power is transmitted through the differential and before it is delivered to the driving wheels, the speed at which the differential group revolves for a given speed of driving wheel is greater, and as a result the torque for a given horse-power transmitted is less. At first glance it would seem that this system would be less efficient, because of the additional number of gears employed, but, as compared with a bevel gear drive, the end thrust is much less, and it is problematical whether this advantage will not outweigh the extra loss due to the additional pairs of gears.

MOST ADVANTAGEOUS ARRANGEMENT.

So far as the differential is concerned, the ideal condition of affairs exists when the differential group is located in the change gear box attached to the frame of the car, and is connected with flexible driving shafts to the sprockets, also on the frame. In this position it is protected from the road jars by the car springs and tires, and from distorting influences by the flexible shafts; and as a further reduction can be obtained in the chain drive to the wheel, it need not transmit the full driving torque. There is, however, in some quarters a decided tendency to avoid the use of chains, because of the additional troubles peculiar to these transmission devices.

As has been said, the first defect noted in the differential gears in use to-day is that it is necessary, in order to start a car, to have a good road surface under each driving wheel. If one of the driving wheels is unable to obtain sufficient hold upon the road surface, owing to the slippery or greasy condition of the same, that wheel will spin around idly, while the other remains stationary, with the result that the vehicle will not start. This uncertainty ot starting is a serious matter in the case of the heavy commercial wagon, the practicability of which depends to a great extent upon its ability to do work under all sorts of road and weather conditions, and any factor which tends to lessen this ability is necessarily an evil. It has been found desirable, in certain instances, to provide a locking device for the differential group, which, while effective, adds further complication to an already complicated car and greater likelihood of trouble.

THE DIFFERENTIAL AND SKIDDING.

The second defect in the differential contains an element of danger. In driving a car over a greasy road surface, any difference in the tractive quality of the road surface under the driving wheels tends to spin one wheel and to apply a sudden braking action to the other, which effects, coupled with the momentum of the car, tend to swing its rear end in one direction or the other. It is true, of course, that skidding is often due to other causes, such as the centrifugal force generated in turning at speed, but careful driving will eliminate this danger.

Again this tendency is seen in braking the car. When the braking action is applied to the wheels themselves, in order to have an absolutely equal action upon both wheels, and consequently to bring them to rest at the same instant, three factors must be exactly equal, respectively, at the two sides of the car; they are (1) the tension upon the brake bands; (2) the friction coefficient between the brake bands and the brake drum, and (3) the friction between the road surface and the tire. By means of an equalizing device it is possible to obtain a practically equal tension on the two brake bands, but the other two factors are harder to regulate—the last being entirely outside the control of the driver or designer of the car.

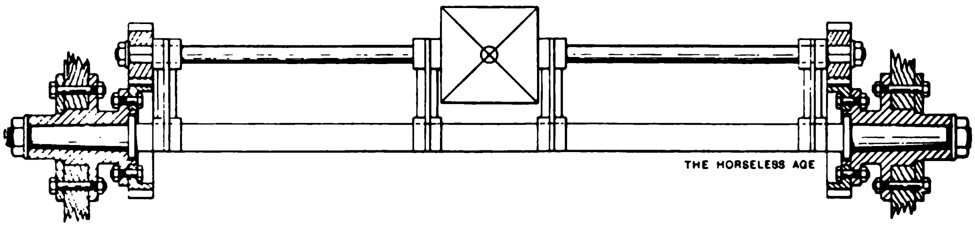


FIG. 4.

Assume, for the sake of argument, that the first and last of these pairs are equal, but that the second, owing to the presence of grease or grit upon one band are unequal. Assume also that the car is proceeding down a steep hill, and that it becomes necessary to apply a sudden braking action. One wheel will suddenly come to a stop, and through the action of the differential tend to drive the opposite wheel faster, resulting in a tendency to swing the car from the straight line, which must be promptly corrected by a movement of the steering wheel. This effect is more pronounced when, as is likely to be the case, the first and second pairs of these factors are equal, and the third, owing to a soft spot in the road, are unequal.

The danger resulting from this condition of affairs depends upon the speed with which the car is traveling, the skill, or rather lack of skill, of the operator, and the surrounding topographical conditions. Undoubtedly a large number of accidents are attributable to this cause.

The Denver Race Meet.

Rain put an end to the race meet of the Colorado A. C. at Overland Park, Denver, on August 27th, after four events had been run off. Despite the poor weather conditions, much faster time was made by the cars than at the meet last year. B. G. Campbell, driving a Pope-Toledo, completed five miles in six minutes and eleven seconds, his fastest mile being done in 1:13.

Considerable disappointment was manifested when the rain interfered with what was to be the star event of the afternoon—a race between the 40 h. p. Mercedes, owned by C. L. Chipps, the "Rocket" of C. P. Fritchie, and the Stanley "Comet." President Brunton of the club announced that the remainder of the interrupted races would be run off at an early date. A summary of the four events run off follows:

Five miles—for gasoline cars under 12 h. p.: M. J. Patterson (Franklin), first; W. L. Hess (Ford), second. Time, 8:08½.

Five miles—for gasoline cars under 16 h. p.: A. E. Carlton (Winton), first; E. R. Crumbe (Rambler), second. Time, 8:05.

Five miles—for steam cars under 10 h. p.: Charles Bilg (White), first; G. W. Coffin (Stanley), second. Time, 11:09.

Five miles—for gasoline cars under 24 h. p.: B. G. Campbell (Pope-Toledo), first; G. A. Maxwell (Peerless), second. Time, 6:11.

The Municipal Council of Moudon, Switzerland, has voted to take 2,700 francs of shares in a company formed to operate an automobile service between Yverdon, Donnelove, Thierrens and Moudon.

OMMUNICATIONS

Chicago to Florida.

r HORSELESS AGE:

ı you or some of the HORSELESS AGE rs give the whole or parts of the route Chicago to Miami, Florida?

MIANDER.

erhaps the best route would be by of Cleveland, Pittsburg and Washing- and then down the coast to Florida. usual route from Chicago to Cleve- is as follows: Chicago, Valparaiso, Porte, South Bend, Elkhart, Goshen, rsburg, Kendallville, Waterloo, But- Bryan, O., Wauseon, Toledo, Fremont, alk, Oberlin, Elyria. The following route from Cleveland to Pittsburg: land, Chagrin Falls, Auburn, Troy, nan, Southampton, Warren, Youngs- Poland, Petersburg, Darlington, er Falls and down the right bank of Ohio River to Pittsburg. From Pitts- you can reach Washington, D. C., over National Highway route described in issue of June 29 last. Beyond Wash- n, D. C., the country is practically un- red territory as far as automobile tour- s concerned. We hear, though, that automobilist made the trip down the last year at the time of the Florida and possibly he is among our read- nd can furnish some particulars of the and roads.—ED.]

t to Lansing and Grand Rapids, Mich.

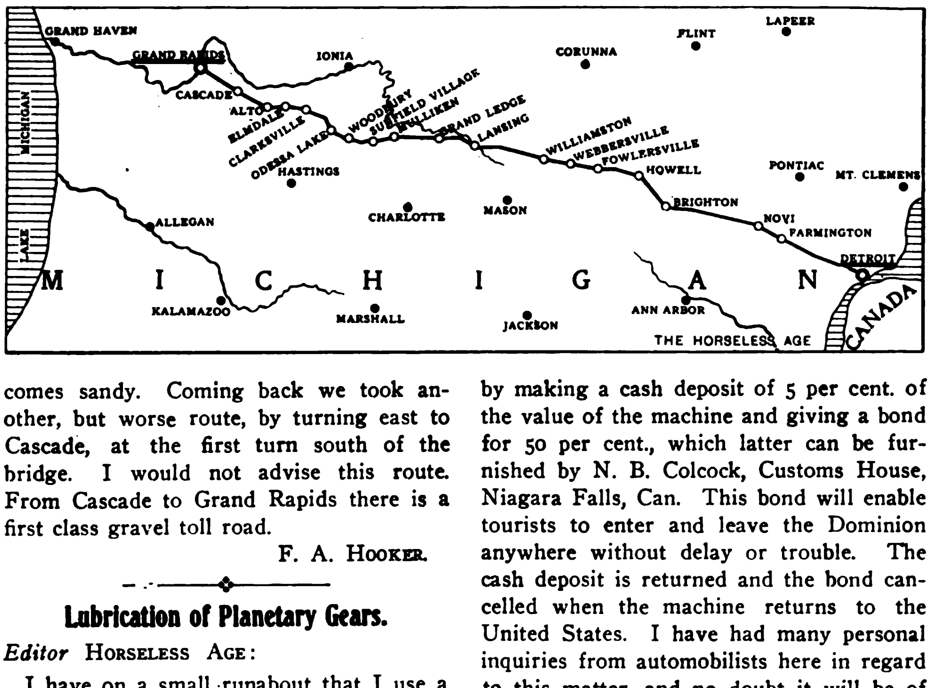
r HORSELESS AGE:

lowing is a road description of the route, which the writer covered re- :

ve Detroit by the Grand River road ı is paved most of the way to the gate. From the toll gate the first e miles is old plank road, and one nake twelve miles an hour on this. comes a fine hard gravel road which ds through the villages of Farming- and Novi, to near Brighton, which ty-five miles or thereabouts from De- After Brighton sandy roads are for a few miles, but they are not bad. From Brighton through Howell, ersville, Webersville and Williamston gricultural College and to within three of Lansing the road is good; then vs one mile of sand, the worst of the route, and then good, hard roads and nent into Lansing.

go from Lansing to Grand Rapids, Lansing via Saginaw street, and go ten miles to a point one mile south rand Ledge. There turn north to d Ledge and from Grand Ledge drive and west on the south side of the to Mulliken. The road is good all the way. The next four miles is hilly, to a point ½ mile south of Sunfield Village. A better route is to avoid Grand Ledge, keeping straight west from Lansing for a distance of twelve or thirteen miles, to a point 1½ miles south of Sunfield Village, then turning north one mile, when the other route from Grand Ledge is struck. From ½ mile south of Sunfield go west four miles, then north one mile to Woodbury Village. The road by this route is superb all the way from Lansing to Woodbury. Cross the railroad at Woodbury, going north; turn west at first corner north of track, about ½ mile, then run west two miles, crossing railroad, then north ½ mile, crossing railroad, then west ½ mile to lake. Keep to the north and west around lake to village of Lake Odessa. From Lake Odessa run west one mile, then north three miles (about), then west one mile, then north one mile, then west 3½ miles to Clarksville. The road is good from Woodbury to Clarksville. From Clarksville we went through Elmdale to Alto and from there to Cascade. The road is fairly good until within a mile or so of Cascade, then it becomes sandy. Coming back we took another, but worse route, by turning east to Cascade, at the first turn south of the bridge. I would not advise this route. From Cascade to Grand Rapids there is a first class gravel toll road.

F. A. HOOKER.



Lubrication of Planetary Gears.

Editor HORSELESS AGE:

I have on a small runabout that I use a planetary transmission gear that is old but very little worn. It is dust-proof, but not oil retaining. It is, however, quite noisy, owing to inability to keep lubricants inside. After warming up the lubricant is forced through, and I have an ink shower bath.

When the gears are packed with Albany Grease, it dulls the noise decidedly, but this soon melts and is thrown in all directions. Ordinary axle grease (mica) is even worse. I tried a mixture of high-test gas engine oil and graphite, but though the mixture does not scatter as much, it oozes out and leaves the graphite in a hard mass, packed away in corners from the teeth, and the usual noise results. I will be very grateful for any suggestions from you or your readers.

In placing lubricant in such a gear, should it be packed in until the case is full? This seems to give better results in the matter of dulling the noise, but with graphite and oil the mass has a tendency to bulge the sides of the case. The gears are small—otherwise I should have rawhide pinions.

RUNABOUT.

[We believe there is no remedy for this difficulty, as it is due to faulty design. Planetary gears are now made with no moving joints in the outer casing, so that the casing resembles a hollow drum, with only one central opening in each head, perhaps one-half the diameter of the drum itself. Perhaps some user of old-style planetary gears can suggest means for minimizing leakage and slopping of oil.—ED.]

Canadian Customs Formalities.

Editor HORSELESS AGE:

As many American automobilists would undoubtedly like to tour through the beautiful province of Ontario, Canada, I would like to inform your readers that automobiles may be entered in Canada by tourists by making a cash deposit of 5 per cent. of the value of the machine and giving a bond for 50 per cent., which latter can be furnished by N. B. Colcock, Customs House, Niagara Falls, Can. This bond will enable tourists to enter and leave the Dominion anywhere without delay or trouble. The cash deposit is returned and the bond cancelled when the machine returns to the United States. I have had many personal inquiries from automobilists here in regard to this matter, and no doubt it will be of interest to many of your readers.

W. W. DORAN.

Word From a Buyer.

Editor HORSELESS AGE:

In your paper of June 29th I notice an article by a manufacturer in which he complains of the lack of confidence the public have in advice freely given by the makers, and also regrets the mistake some manufacturers are making in giving the public what they want instead of what they ought to have.

In the first place the makers have so shaken the confidence of the public that the result could not be otherwise than that

of which they now complain. When the first auto show was held in New York, the public "took for corn" all the "fairy tales" of these manufacturers. Since then the public have had some road experience, have proved themselves very apt scholars and each year these manufacturers have found it necessary to curtail these tales to avoid questions hard to answer. Every manufacturer blows for his own goods, but the public are and will remain the judges of them, a matter beyond the power of the manufacturers to change. If the manufacturers' knowledge boxes are as full as they would have us believe, why not drain them a bit, and when we buy a machine give us a more complete book of directions, in place of the tracts which from appearances are cut off in a dried beef machine. On purchasing a machine this spring, after paying for same I was handed one of these leaflets on "How to run it and how to make it run." It said there was an engine and mentioned a few parts including an oiler and the brand of oil to use. It did not say that the washer on the cap of this oiler was tar paper which would grind up, fall into the oil, stop up valves and pipes and cause bearings to burn out. It did not say that a 16-inch Stilson wrench would be necessary to make this cap tight enough to prevent a waste of oil and loss of force in the tank. The manufacturer of my car did not furnish or make a wrench to remove the oil plugs which are so located as to be impossible to remove with anything but a special socket magnet wrench. This book contains no mention of a pump or several other parts.

The builder of my machine built a most important part good, the engine, he then tired, went abroad, and I would judge the other goods necessary to complete the machine were purchased of some 10c. store the cheapest of their several kinds.

Regarding "giving the public what they ought to have instead of what they want," I think the public would be satisfied if the manufacturers would deliver either; they have not as yet. I would suggest as reason for the lady wanting a particular color car, that she desired to make sure that there was one thing about the auto to her liking.

What we want and what the manufacturers should make, is a car of wearing quality such as our friend Robin Damon found and rented when he visited Paris. "S."

Calendar of Automobile Dates and Events.

Sept. 7.—Albany Race Meet.

Sept. 10.—R. I. A. C. Race Meet, Providence, R. I.

Sept. 24.—Race Meet at Empire City Track, Yonkers, N. Y.

Oct. 14-22.—Leipzig Automobile Show.

Nov. 24.—Eagle Rock (N. J.) Hill Climbing Contest.

Dec. 9-15.—Paris Show.

OUR FOREIGN EXCHANGES

Fifth German Automobile Congress.

The German Automobile Association, comprising some twenty local automobile clubs, held its fifth annual meeting at Breslau, from August 18th to August 20th. The gathering of automobilists from all parts of the Fatherland was rather small, but the event was nevertheless a very successful one, and the different sessions concluded harmoniously. The arrangements were in the hands of the Silesian Automobile Club.

The delegates of the different clubs were received on Thursday evening, August 18th, by the Duke of Ratibor, for the German Automobile Association, and Count Kospoth for the Silesian Automobile Club. The first session of the association was held on Friday morning in one of the large rooms of the City Hall. The first subject on the programme was the discussion of a project for regulating the professional driver question. After a lengthy discussion, this project, which had been worked out by Gen. Becker, was adopted with a few minor amendments. The next business considered was the appointment of the *Allgemeine Automobil-Zeitung* as official organ of the association. The treasurer's report showed that the receipts of the association during the year had been roughly 7,000 marks, and the expenditures 2,000 marks, leaving a balance of 5,000 marks.

Another question discussed was the erection of danger signs. It was decided to make an appropriation of 2,000 marks with which to purchase signs of a design submitted by one of the members, and that the expenses of erection should be borne by the individual clubs. The sign indicating that care is to be observed is made in the form of a large wheel, and, it is thought, will be visible both night and day. During the past year the following new clubs joined the association, which now has a membership of twenty-one clubs with more than 2,600 individual members: The Rhenish-Westphalian A. C. in Dusseldorf; the North German A. C. in Hamburg, and the Saxon-Thuringian A. C. in Zwickau.

At the conclusion of the business session, a number of papers were read before the Congress, as follows: Count Von Sierstorpf, "What the Gordon Bennett Race Has Taught Us"; Max R. Zechlin, "What Does the 1904 Gordon Bennett Race Teach Us With Regard to the Technical Development of Motor Vehicles"; Leon Van Westrum, "On the Abatement of the Dust Nuisance."

On Friday afternoon at 3 P. M. the delegates to the Congress participated in a run to the Scheitniger Park, the vehicles lining up in front of the Hotel Monopol, the headquarters of the Silesian A. C. The parade comprised about forty cars. In the evening there was a banquet at the hotel. A run to the Castle of Fürstenstein on Saturday morning, in which about thirty cars participated and which was favored by excellent weather, concluded the meeting. Following are the regulations regarding the professional driver question which were adopted by the association:

The member clubs of the German Automobile Association deem it one of their duties to exert their best efforts in furthering the training of competent and reliable automobile drivers. It is to their advantage to make suitable arrangements in this regard with the automobile factories, larger repair shops and automobile-drivers schools located in their territory. The best material for automobile drivers is furnished by trained locksmiths and mechanics, discharged firemen of the Imperial Navy, etc. The authorities have reserved to themselves the right regarding examination of the drivers, as well as the determination of the degree of skill and practical knowledge to be required, and the issuing of driver's licenses. In case it is desired, the clubs will endeavor to assist the authorities in the examination by delegating particularly expert members and offering the use of vehicles and driving tracks.

The member clubs of the German Automobile Association are empowered to select from among drivers possessing official licenses, particularly skilful and reliable men, to appoint them "auters of the club," and issue to them a diploma and distinguishing badge or sign, the design of which will be determined by the association. In the diploma it is to be expressly stated whether the driver is suited to guide pleasure vehicles at over 50 km. per hour. The distinguishing signs, which are to be numbered, consist of the club badge with the border inscription "German Automobile Association" and are to be two inches in diameter.

The clubs keep a list of the drivers appointed by them, and at the end of each month send a report of all appointments, with the filled-in blanks, to the business office of the association. Similarly, all changes and discontinuances are reported. The business administration will periodically publish a list of the nominations in its official organ, and at least once annually a list of all drivers engaged through club management.

As far as possible the drivers shall be retained in the service of members of the club by which they were appointed. In cases where there are good reasons a driver may be transferred from one club to another, but the new diploma and badge shall be delivered only after the driver has proven that he has returned his former diploma and badge. Every club is duty-bound to continually observe the behavior of its drivers, and to take the necessary measures to ensure good conduct (warnings, disciplining, etc.). If the driver neg

ıis duties, the club has at all times ght to withdraw his diploma and In such cases a notice must be sent headquarters of the association, in that the fact may be published and ıme of the driver struck from the ist. A driver who has been deprived diploma can be reinstated only after ·, at the earliest, either by the club issued his first diploma, or by an- The clubs concerned must reach an ıtanding before a driver is reinstated. driver must always carry his badge either on his headgear or overcoat driving a car. In case drivers or- themselves into trade unions which · calculated to improve their profes- he clubs should assist these in every :r.

members of the clubs belonging to erman Automobile Association, who tered in the list of gentlemen drivers, be in possession of a driver's license by the authorities, and wear as driv- adge their club badge transferred on :e silver star, also two inches in diam- It is to be desired that all gentlemen s wear this badge whenever they a vehicle on the public streets.

amendments to these regulations :d are as follows: All drivers must give notice of any change of posit :lub. The administration of the asso- ı shall confer with manufacturers re- ıg the training of skilled drivers in ctories.

lectrolytic Copper Water Jackets.

ıough electrolytically formed water- s for petrol engines do not as yet ap- :o have proved very satisfactory in :e, partly because they are delicate and shown themselves to be liable to de- leaks, yet some details concerning construction will doubtless be wel- l. Copper jackets have hitherto been with the object of reducing the weight : engine and of enabling the cylinder to be machined both inside and out, in to ensure an equal thickness of metal, itherto, they have been made of sheet and a certain amount of difficulty has experienced in forming a water-tight betwen them and the cylinder itself. sheet-metal jackets, too, it is difficult ovide for any irregular shapes, and the majority of these jackets have circular, and have merely surrounded all and not the head. By the electro- process, however, the jacket required e made of any external shape, and can med around a cylinder of any required In fact, the jacket can be constructed d a casting forming more than one cyl- The cylinder itself is, in the first coated with a deposit of copper in the olytic bath, and this coating in reality the inner side of the jacket, which finished is a complete watertight bag ıtinct from the cylinder itself. After this preliminary process, that portion of the cylinder around which the jacket is required is covered with wax to a thickness equal to that of the water space needed, but at those points where the outside of the jacket is required to join the cylinder, the original copper plating is left bare. The wax is thoroughly coated with plumbago to give it a conducting surface, and the whole cylinder is then again placed in the "plating" bath, and the electrolytic action continued until a sufficient thickness of copper has been deposited over the surface; the wax is afterwards melted by heat and allowed to run out. In order to avoid porosity or brittleness of the deposited copper, a low current density is used when commencing the plating process. It is claimed that the completeness of the copper jacket in itself obviates any troubles that would otherwise arise from unequal expansion of the jacket and the cylinder, and we are told that if the jacket is given a suitable corrugated shape externally, a thickness of metal of about 1-50th of an inch is sufficient for practical purposes. Jackets of this thickness have, we understand, been tested to a pressure of 80 pounds per square inch, showing no signs of defect; and tests, too, have been made of allowing the cylinders to get hot with a dry jacket and of then admitting cold water under very much more severe conditions than would arise in practice. The weight of the jacket thus formed is apparently no heavier than if made from spun or rolled sheet metal. It is pointed out, too, that bosses projecting from the cylinder to the outside of the jacket do not interfere with its formation, since it builds itself up around them, and there is, therefore, no difficulty in making any water-joints. In certain cases, however, a method of reinforcing the joint around the boss is adopted so as to render it better mechanically; this, for instance, is done where the ignition plug is fitted, because the plug is liable to be frequently removed and replaced, and this operation might ultimately damage the copper jacket. —*Automotor Journal.*

The Dublin Board of Trade has given the exclusive right to use the foreshore at Portmarnock, County Dublin, to the Irish Automobile Club for September 6 and 7, and motor races are being organized. The Velvet Strand, as the place is called, will allow the competing cars to be started two or more abreast at a time. Portmarnock is six miles from the city of Dublin.

A reliability contest for automobiles is to be held in India next Christmas, over a course of 880 miles, from Delhi to Bombay. Among other trophies to be competed for will be a cup offered by the Geikwar of Baroda. Entries are received by the honorable secretaries, F. R. Hill and A. Hoane, the Motor Union of Western India, 11, Elphinstone Circle, Bombay.

An important trial of military transport took place on July 27th, with the 20th Middlesex (artists) used this means of sending their regimental stores and camp equipment from London by road to Newhaven. They employed one of the Cadogan Garage and Motor Company's gasoline trucks which carried successfully over 5½ tons of stores at an average rate of seven miles per hour.

According to the British Consul at Moscow, Russia, the automobiles in that city are increasing in number, despite the bad streets. Most of the cars used are French or German, and a few of native construction, with the exception of the more delicate parts. He advises that parts of cars imported be shipped separate from the body, as by this means a saving in customs is effected.

A number of modifications in the rules for the French Gordon Bennett Eliminating Trials for next year have been proposed by the Marquis De Dion, as follows: The firm whose three cars shall make the best total time shall be chosen to represent the national colors in the race. The eliminating trials shall be over a course of 620 instead of 310 miles, and shall be run on two successive days. At the close of the first day the cars shall be enclosed in a park, and no repairs, even to tires, will be permitted. All repairs must be made during the course of the trials, and the time thus occupied will be counted in the trial. The race itself shall be run under similar conditions—that is, in teams—and marks shall be totalled over the same distance. The drivers of the different cars may be replaced *en route* at will.

The second annual general meeting of the Society of Motor Manufacturers and Traders, Limited, was held at the Hotel Cecil, London, on Thursday, August 18th. The president, Frederick R. Simms, occupied the chair. A new council was elected at this meeting. The chairman referred to the great increase in membership of the society since its formation a little more than two years ago, the number of members at present exceeding 120, thus making the society larger than any other similar association in any country. Reference was made to the strong financial position of the society. The funds in hand were ample to meet all demands till the society's next show, and Sidney Straker, as chairman of the Olympia Exhibition Committee, emphasized that the success of the exhibition is assured, over 90 per cent. of the space available having already been taken by leading firms.

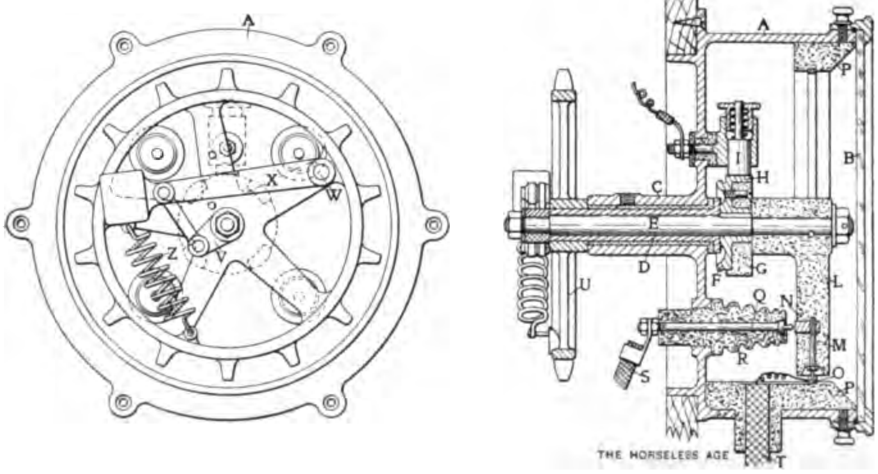
New Multi-Cylinder Commutator and Automatic Timer.

This device is the invention of S. Brotherhood and C. W. Bryant, of London, England, and admits of firing a multi-cylinder engine with a single spark coil.

The casing A which is closed by a removable transparent cover B carries a bearing C in which revolves the hollow shaft D. The latter forms a bearing for the shaft E of the contact breaker. This contact breaker comprises a metal disc F having a central hollow boss keyed on to the shaft E and four arms H projecting at right angles to it. To the metal disc is fastened a disc G of insulating material having recesses into which the arms H fit. Thus, when the metal spring plunger I bears upon the periphery of the rotating contact breaker it is successively brought in contact with the arms H, which connects it through the shaft E with the primary circuit. The metal casing of the spring plunger I is fixed to the casing A, but is insulated therefrom and is made a part of the primary circuit.

The moving part of the commutator consists of an arm L of insulating material carrying at its outer end a metal pin M which is screwed into a plug N fitted into the face of the arm. The length of the arm L is such that the end of pin M travels close to a metal ring O mounted, to correspond with the path described by the pin, in an insulating ring P fixed in casing A. The fixed part of the commutator consists of four metal pins Q mounted in insulating plugs R in casing A. Each pin is connected with a lead S passing to one terminal of the spark gap in one of the cylinders, the other terminal being connected with the secondary circuit. The pins Q are of such length that the plug N passes very close to them as the arm L revolves. As will be seen from the figures, the angular position of the arm L on the shaft E and the position of the pins Q around the axis of the shaft are such that while the primary circuit is completed through plug I the plug N is passing a pin Q. When this is the case the ring P being connected with the secondary circuit through the lead T, a spark occurs between O and H, N and Q, and across the spark gap in the particular cylinder whose charge is to be fired. In order to govern the ignition it is only necessary to shift the angular position of the shaft E relatively to the gear that drives it from the engine shaft, because both the contract breaker F and arm L are keyed to this shaft.

To make such governing automatic, the gear, such as the sprocket wheel U, is caused to drive the shaft E through a coupling as follows: The sprocket U is keyed to the hollow shaft D and carries on a pivot W a weighted lever X which is linked to an arm Y keyed on the shaft E. Stops on the sprocket limit the movement of the lever X on its pivot W, and a spring Z urges it to return to its position of rest against the stop. When the speed of the sprocket wheel has risen above a certain limit the lever W moves toward the opposite stop in obedience to centrifugal force, thus turning the shaft E into a new angular position relatively to the sprocket wheel U.



Brotherhood and Bryant Circuit Breaker and Timer.

New Steel Frame Company to Erect Plant.

The Worcester Pressed Steel Co., which was recently organized in Worcester, Mass., will erect a new plant at Barber's Crossing within the next year. The company is capitalized at $50,000. All the stock has been subscribed for, we are informed, the greater part by Worcester capitalists, and application has been made to the Secretary of State for a charter of incorporation. Milton C. Higgins, of the Norton Emery Wheel Co., is president of the board of directors, and John W. Higgins, secretary and general manager. The property of the Worcester Ferrule and Manufacturing Co. has been taken over by the new concern. This company has for some time given considerable attention to the manufacture of pressed steel parts for the automobile trade, and has an extended trade with several foreign countries in all kinds of cold drawn steel work.

Club Notes

McHENRY (ILL.) A. C.

Members of the club to the number of forty-two spent Saturday, August 27, at the Blatz. They made the run from Woodstock, Ill., in fifteen cars.

CEDAR RAPIDS (ILL.) A. C.

The second annual banquet was held at Delevan Hotel on August 25, about twenty members being present. In the absence of President Averil, Vice-President Taylor presided, and W. G. Haskell acted as toastmaster. Dr. Whelpley, C. L. Miller, George Henderson, W. H. Dunshee, R. P. Taylor, E. A. Sherman, C. D. Fawcett, L. M. Hull, W. P. Powell and others responded.

CHICAGO A. C.

The membership limit of the club has been increased from 300 to 500, the list having been considerably swelled recently, owing to the legal fight with the City Council. The touring committee has in course of preparation a road map of the territory within a radius of 100 miles of Chicago. A series of gentlemen's races will be held at Harlem track in October.

NASHVILLE (TENN.) A. C.

A second meeting was held on August 26 to perfect organization. The question of opening membership to all owners of cars within the State was discussed, but not acted upon. By-laws were adopted which give the Board of Directors power to investigate complaints made against any members for careless driving and to punish such members if the charges are sustained.

CLEVELAND A. C.

At a meeting of the board of governors held at the Hollenden House on August 31, it was decided to send a circular to each licensed automobile owner in the city quoting the State law and city ordinance in regard to the use of automobiles on the public highways and calling upon the owner to comply with the law at all times and to cooperate with the club in suppressing scorching.

GRAND RAPIDS A. C.

At a recent meeting, arrangements were completed for the entertainment of the Chicago A. C. on their coming visit. The members will meet the visitors at Holland on the morning of September 10, and will escort them to Grandville, which is to be their headquarters. A race meet Saturday afternoon, a banquet in the evening and a run on Sunday are some of the features of the programme arranged by the committee in charge—Dr. Perry Schultz, L. W. Welch and N. S. Avery.

End of the Solid Tire Pool.

The pool which has existed during the past twelve months in solid and cushion rubber tires expired on September 1, as the result of a decision reached at a meeting of manufacturers held in New York early in the past month. The arrangement which has thus terminated had reference to the maintenance of prices, and was guaranteed by the parties to it giving bonds, while the secretary of the pool had authority to examine the books of the various factories. As an aid to carrying out this agreement, there was an allotment of production among the factories; or, rather, those firms turning out more than their allotment contributed to a fund which was divided among firms not receiving their share of orders.

It is understood that the manufacturers' agreement in respect to "clincher" pneumatic, which has existed for a year past, remains in force.—*India Rubber World.*

Automatic Milling Machine for Rounding Ends of Gear Teeth.

Until now it has been customary to round the ends of gear teeth of sliding change speed gears by hand, a rather tedious, expensive and imperfect method. A machine has now, however, been designed by Marcel Lejeune, of Paris, for effecting this work mechanically and with mathematical exactness. As sliding change speed gears are coming into use more and more, and the hand rounding of the teeth is particularly unsatisfactory in this country, owing to the high cost of labor, this machine, or a similar one designed to accomplish the same work, should find extensive application here, and we reproduce, therefore, from the *American Machinist* the accompanying illustrations of the Lejeune machine, and the following description:

The curve on the gear teeth needs to be made on one side only. Moreover, the consecutive flank forming part of the same outline remains full. In this way the tooth which is to enter the curve comes first against the cut-away corner, which facilitates its entry, and then bears against the remaining full part. This obviates its tendency to be thrown out as in the case of rounded teeth.

In this machine the gear to be cut has only a simple rotary motion, the movement of translation being given to the cutter. From the combination of these two movements results the desired curved form, and the number of teeth is obtained by means of a train of gearing. The spindle *a* on which is fixed the gear to be cut, *b* (Fig. 1) carries a gear *c* (Figs. 1 and 2) driven by a small gear *d* on the axis of which is keyed a change gear *e*, with the necessary number of teeth to obtain the desired result. The gear *e* is driven by another, *f*, keyed on a shaft *g* which carries fixed gears *h*, *i*, *k*, enclosed in a casing *l* (Fig. 3). Any

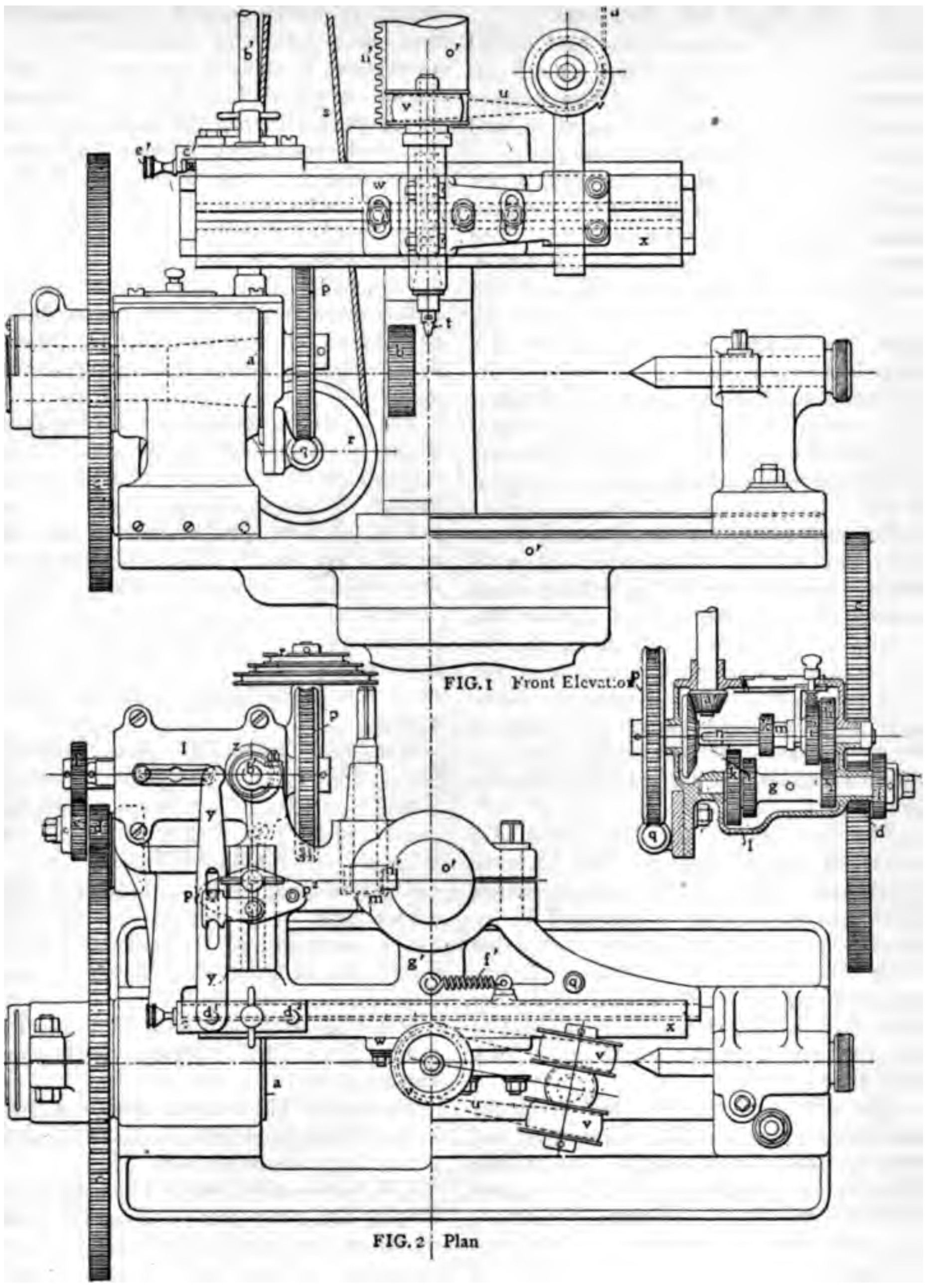


FIG. 1 Front Elevation

FIG. 2 Plan

LEJEUNE'S AUTOMATIC MILLING MACHINE.

one of these gears may be driven by the gears *h'*, *i'*, *k'*, carried on a clutch *m*, which can slide on a driving shaft *n*. On this shaft is fixed the bevel gear *o* and a worm gear *p*, driven by a worm *q*, actuated by a suitable belt *r*, *s*.

The cutter *t* is given a rotary movement by a belt *u* and pulleys *v* having an adjustable support *w*. It is evident that this support is fixed on a sliding carriage *x*, taking a reciprocating horizontal motion from a lever *y* which bears against a cam *z*. This cam is turned by means of the vertical shaft *b'*, by the action of a bevel gear *a'* meshing with the aforesaid gear *o* (Fig. 2). The movement of the lever *y* is regulated by a guide *c'*, to which it is fastened at d^1 and the position of which is determined by a screw *e'*. A tension spring *f'* is fastened between the frame *g'* and tool carriage *x*.

In order to be adapted to the different diameters of gears that are to be cut, the upper part of the machine may be raised or lowered in relation to the shaft *a* by means of a shaft *l'* on which is fixed a gear *m'* meshing with a rack *n'* attached to the fixed frame *o'* (Fig. 2).

Fig. 2 shows the lever *y* arranged for making the cutter work from right to left, but if it were desired to machine the opposite side of the gear *b*—*i. e.*, to work from left to right—it would be necessary to fasten this lever at d^2, its point of oscillation would be changed from *p* to p^2 and the spring *f* would be fixed at *g'* to the movable frame *g'* the motion thus being reversed.

With this machine thirty wheels of different diameters suffice for the machining of gears with 10 to 118 teeth.

Del Monte, Cal., Race Meet.

A two days' race meet was held at Del Monte, Cal., on August 26-27, by the Automobile Club of California. The weather conditions on each day were excellent, and as a result the attendance was large.

The first event of the first day, a five mile race for gasoline cars of less than ten horse power, was run off in heats. The first of these was won by Arthur C. Hull, driving a Cadillac; the second, by C. H. Letcher, also driving a Cadillac. In the final heat Letcher came in a winner, his time being 7:24.

The second race was open to light gasoline cars in touring condition and was won by Hary Cousins in a Rambler. The distance was five miles, which he covered in 8:16⅘.

Because of large number of entries it was necessary to run off the third event in heats. It was a race of five miles for cars costing between $2,000 and $4,000. The White car driven by H. D. Ryus, and the Pope-Toledo of F. J. Swentzel, were the first cars to finish in their respective heats, and in the final the honors were captured by the former. His fastest mile was made in 1:04 and his time for the whole distance was 5:25½.

The final heat of the fourth race, five miles for cars of between 10 and 16 horse power, proved the most interesting contest of the afternoon. J. Schnerr and C. H. Letcher were matched against each other with their Cadillac cars. The result was not to be known until the end of the last lap, when Schnerr drew gradually ahead of his rival and finished a length in the lead. The time was 7:14½.

The fifth race was an open event for cars costing $1,200 to $2,550 inclusive, and was of five miles in length. The leading position was contested for by L. P. Lowe (White) and W. E. Saunders (Rambler), the latter finally securing it.

The last event of the day was a pursuit race for gasoline cars costing $1,000 or less. The three competitors, J. Schnerr, C. H. Letcher and Arthur C. Hull, were started one-quarter of a mile apart. In thirteen minutes and five seconds Letcher had overtaken and passed both of his rivals and thereby won the event.

The feature of the second day's racing proved to be the breaking of the world's record for cars in touring condition. R. G. Fowler driving a Pope-Toledo covered five miles in 6:33 4-5, which was six and one-fifth seconds faster than the previous record for this class.

The race for the Interclub Challenge Cup did not materialize, as the challenger, F. A. Barbutt, of the Automobile Club of Southern California, had trouble with his car and withdrew before the start.

The final for the Del Monte Club was run off between G. P. Fuller, driving a Pope-Toledo, and F. J. Swentzel, in a car of the same make The winner was never in doubt, as Fuller secured a commanding lead soon after the start and held it throughout, finishing in 5:21 2-5. His fastest mile was made in 1:08 4-5. There were two pursuit races on the programme, one for road cars costing between $2,501 and $4,000, and the other a free-for-all. The first of these was won by Dingley in a Pope-Toledo and the second by Fuller, also driving a Pope-Toledo.

A summary of the other events follows:

Five miles for gasoline cars costing $1,099 or less—C. H. Letcher (Cadillac), first; F. W. Hunt (Oldsmobile), second. Time, 7:39.

Ten miles for touring cars costing from $1,551 to $4,000—R. G. Fowler (Pope-Toledo), first; P. Dismet (Pope-Toledo), second. Time, 13:24 4-5.

Five miles for gasoline cars of from 10 to 24 horse power—Saunders (Rambler), first; W. K. Cowan (Rambler), second. Time, 6:13 2-5.

Five miles for cars of from 10 to 24 horse power—G. P. Fuller (Pope-Toledo), first; Saunders (Rambler), second. Time, 5:26.

Five miles, free-for-all—Ryus (White), first; Dingley (Pope-Toledo), second. Time, 5:37 4-5.

Racing Notes.

The Rockland, Ill., A. C. is soon to hold a race meet.

The newly formed Nashville A. C. held a race meet at Cumberland Track on Labor Day.

Motor car races will be held during the coming State fairs at Nashua, N. H., and Lewiston, Me.

The annual hill-climbing contest will be held at Eagle Rock Hill, N. J., on Thanksgiving Day, November 24th.

The Automobile Club of Pittsburg is arranging for a meet at the Brunot's Island tracks on September 23 and 24.

Newkirk, driving the Ford-Cooper "999," broke the mile record for a half mile track at Aurora, Ill., on August 27th, making the mile in 1:12 3-5.

The Kansas City Club is planning to hold a meet in the near future, but so far have been unable to select a satisfactory date.

The Buffalo Automobile Racing Association is arranging for the second race meet of the season, to be held at Kenilworth track some time in September.

It is reported that the track at Poughkeepsie will be sprinkled with oil on the morning of September 16th, the day of the meet of the Dutchess County Agricultural Society.

The four cylinder Pope-Toledo, which has been driven by A. C. Webb at many of the recent race meets, has been entered for the Vanderbilt Cup races. The entry of George Arents, Jr.'s, Mercedes has been received from the A. C. of Germany.

A circuit of race meets is planned through the South in January, February and March. Following those at Ormond and Daytonia, Fla., meets are likely to be held in Cuba and at Savannah, Charleston and New Orleans.

Prizes aggregating $1,500 in value are offered for the twelve events to be run off at the race met of the Albany (N. Y.) Automobil Club, which will be held at Island Park on September 17. Entries will close on September 11.

Preliminary arrangements are completed for the race meet of the R. I. A. C. at Providence on September 10, Kiser and the Bullet No. 2, Lyttle and the eight cylinder Pope-Toledo, and Carl Fischer with the eight cylinder Comet, are practically sure to appear. Cannon, who holds the track record for steam cars, is matched against Ross, who made the straightaway record at Ormond last winter in the race for steamers, and a number of fast Mercedes cars owned in and around Newport are expected to be present. Entries close September 8th.

Empire City Track Race Program.

Announcement of the program for the regular circuit automobile meet at Empire City track, Yonkers, N. Y., on September 24th, shows that besides the special match races to be arranged, there will be five regular events. One race will be at five miles for the "Old Glory" cup, open to American touring cars with regular equipment carrying four people. Minimum weight for men 150 pounds and for women 125 pounds. In this race the operator is required to crank the machine and then get in the car and cover the distance.

For the "International" cup there will be a ten-mile race among the winners of the trial heats. The heats will be at five miles, one race for each nationality. There will be a separate heat for American cars, for French cars, for Italian cars, for German cars and for English cars. The winners will meet in the grand final.

The third race is at ten miles for the "Knickerbocker" cup for cars weighing from 881 pounds to 1432 pounds. On account of its being a success at every meeting, the Empire handicap, at five miles, will be renewed. This race is open to all machines.

For the small cars there is the "Yonkers" cup for a five-mile race, open to cars costing $1000 or less, the machines to go with their regular equipment. Cups will be given to the second driver to finish in each of the races. Entries will close Monday, September 19th, with Alfred Reeves, secretary, 390 Washington street, New York.

The German Technical Automobile Association founded about a year ago has now over 200 members, and adds new names to its list every week. By the way, what has become of the Automobile Engineers' Association in this country?

MINOR MENTION

The police of St. Louis are making use of a motor car to catch automobile scorchers.

Automobiles were used extensively in carrying voters to the polls in the recent "local option" election in Toledo.

The capital of the Phelps Motor Vehicle Co. has been increased from $300,000 to $400,000.

It is reported that the Moline Automobile Co. is soon to erect a new plant at East Moline, Ill.

The Y. M. C. A. of Kansas City is to establish a training school for amateur chauffeurs.

One hundred and seventy-five automobile licenses have been taken out in Toledo, O., during the past six months.

The Allegheny Motor Cycle Club, of Pittsburg, Pa., held a run to Bakerstown, on August 28th.

The Haynes-Apperson Co. have opened a branch office at 1713 Broadway, New York City, under the management of F. Y. Carrie.

There are prospects of an early reorganization of the Columbus Motor Vehicle Co., of Columbus, O., which has been in difficulties for some time.

City Electrician Ellicott, of Chicago, announces that several automobile owners may lose their licenses through failure to report accidents, as the ordinance requires.

A. S. Robinson, formerly of the Searchmont Automobile Co., has taken charge of the sales department of the Black Diamond Automobile Co., Utica, N. Y.

E. T. Weiant writes us that he has severed his connections with the Consolidated Supply Co., of Denver, and is now associated with the Automobile Supply Co., of that city.

L. L. Whitman, who started from San Francisco on a transcontinental trip on August 1 last, as reported in our issue of August 10, arrived in New York on Saturday, September 3.

The new ordinance of Saginaw, Mich., went into effect on September 1. Since then fifty-three cars have been registered. The police believe that there are nearly twice that number in the town.

The stock of the bankrupt Lackawanna Motor Co., of Buffalo, was ordered sold to Henry E. Montgomery for $2,010, by Referee Hotchkiss, on August 29, he being the highest of the forty-six bidders.

The second of the automobile runs organized by the E. H. Towle Co., of Waterbury, Conn., was held on August 28. The destination was Woodmont, at which place a clambake was partaken of by the occupants of the ten cars which made the run.

A large number of those who followed the participants in the first fox hunt of the season at Southampton, L. I., on August 28th, rode over the roads along the course in automobiles.

Automobiles are being used at the army manoeuvres at Manassas, Va., to lay ground wires to establish telephonic and telegraphic connections between the various headquarters.

In the recent army manoeuvres at Manassas, General Corbin directed the movements of the troops under his command from an automobile which he used to get about in.

The Metropolitan Park Board of Massachusetts has refused to grant the petition of the Winthrop Selectmen that automobiles be barred from the State reservation in that town.

Dr. A. C. Conway, of Marshalls, Ill., was seriously injured on August 28 by being hit in the abdomen by the starting crank of his car as it rapidly flew around when the motor kicked back.

The Auto Renting Co. has been organized in Newark, N. J., by R. C. Dean, formerly connected with L. C. Wykoff's automobile establishment. The business will be located at Ilane and Bleeker streets.

The number of automobiles owned in Mobile, Ala., has grown from two to eighteen within the past two months. This rapid increase is attributed directly to the improvement of the city's streets, which has been very marked during this interval.

H. S. Woodworth, of Rochester, has been sued for $10,000 damages by John G. Siebold, of Waterloo, N. Y., who claims that he was injured through the frightening of his horse by the car of the defendant.

The Premier Motor Mfg. Co., and Harold Smith, president, are sued for $15,000 damages by James J. Foster, of Indianapolis. The plaintiff alleges that a car driven by Mr. Smith struck his team, killing a horse and severely injuring him.

A suit for $15,000 has been brought against the Geneva Auto and Mfg. Co., of Geneva, O., by Mrs. Rose Ernest, who was injured in a runaway accident when her horses were frightened by a car owned by the company.

Acting Corporation Counsel Barge, of Chicago, holds that the law prohibiting the dropping of oil on the asphalt pavements, although intended to apply to oil peddlers, applies also to automobiles. A fine of $25 to $200 is the penalty provided.

James Shaw was appointed receiver for the Fredonia Mfg. Co., of Youngstown, O., by Judge G. F. Robinson, on August 26th, at the request of the Estate of J. A. Smith. It is claimed that Smith had endorsed notes to the amount of $18,600 and that the company is now solvent.

The Meyer Automobile Co., formerly the Meyer Cycle Co., of Fort Wayne, Ind., is soon to increase its capital stock from $5,000 to $15,000 and will erect a new garage on West Berry street. The building is to be 50 x 150 ft. and two stories high.

The Woodstock Automobile Works of Ontario has assigned to John Mackay. It is said that the liabilities are about $40,000, while a statement presented to the assignee shows visible assets of $240,000. A number of American firms are among the creditors.

Edwin W. Hagar, of Xenia, O., was found dead beneath his overturned automobile near Springfield, O., on August 26th. It is supposed that he had been running beside the road to avoid gravel and had run into a culvert, turning his car completely over.

By a typographical error in an editorial in our last issue we were made to say that a saving in weight of 90 per cent. might be effected by the use of pressed steel parts and steel drop forgings, in place of malleable castings. It should have been 20 per cent.

Reports from the office of the Secretary of State of Iowa show that 759 automobile licenses have been taken out since the present law went into effect April 12, 1904. Of this number five are held by non-residents and ten are cancelled, so that the number of cars in the State may be taken as 744.

The Badger Brass Co., of Kenosha, Wis., is to erect a new plant. The building is to be 36 ft. by 90 ft. and is to be equipped with the latest machinery for producing oil and acetylene lamps. The contracts have been let, and it is expected that the building will be ready for occupancy in ninety days.

A temporary organization of motor car owners was effected in Oshkosh, Wis., on August 19th, the purpose being to obtain a more favorable automobile ordinance. A committee composed of L. Frank Yates, Dr. W. H. Titus and F. Botz was appointed to confer with the automobile clubs in other cities and to look into the matter of automobile legislation in general.

Ou September 1 an automobile driven by Joseph Landay and in which was George B. Dramon, of Springfield, Mass., fell over a twenty-foot embankment in Central Park, New York City. Landay probably saved the life of Mr. Dramon by pushing him from the seat as soon as he saw that the plunge was inevitable. Landay jumped himself and escaped injury.

The coroner's jury in the inquest into the death of the two men who were killed at St. Louis during the race meet, finds that the track was not properly policed, that Scott was disobeying orders in standing where he did, and that the management of the races had arranged to sprinkle the track, but had revoked the order at the special request of the men who were racing when the fatality occurred. They conclude that the victims came to their death through accident.

LEGISLATIVE AND LEGAL.

New Kansas City Ordinance.

An ordinance regulating the speed of automobiles was finally passed by the Kansas City, Mo., Council on August 29. The measure had been amended by and referred back and forth between the two houses of the Council many times during the last two years, the bone of contention being the speed limit question.

As finally adopted, the ordinance fixes a maximum speed limit of eight miles an hour in the district bounded by the Missouri River, Twentieth street, Troost avenue and the State line. On the boulevards and in the park driveways and on all streets of the city outside of the district described and off the boulevards the maximum speed limit is twelve miles an hour.

Each vehicle is to have a number conspicuously displayed in white figures three inches in length on a black background in the rear and must be provided with lamps. The operator of an automobile must have a license which can only be obtained after he successfully passes an examination before a board consisting of the superintendent of streets and two expert automobile operators recommended by the Automobile Club, the members of the board to be appointed by the mayor and to serve without pay.

When an automobile approaches a horse that is fractious and appears to be frightened the operator shall bring his machine to a stop and shall not proceed until he receives a signal from the driver of the horse that he has the animal under control. In case of an accident caused by an automobile the owner or operator shall give his card with full name and address to the person injured or to some one who is looking after the injured person.

There is also provision against approaching a vehicle drawn by a horse from the rear at a high rate of speed without giving the horse a wide berth. The penalty for violation of any of the provisions of the ordinance is a fine of from $50 to $500 and revocation of the license if the offense is repeated.

Another Injunction.

On application made by the Chicago Automobile Club, Judge Donnelly, of Woodstock, Ill., sitting as circuit judge in Lake County, has issued an injunction restraining the authorities of Lake Forest from further prosecution of the suit brought against Franklin P. Smith, of that village, for violation of the ordinance which limits the speed of automobiles to eight miles per hour.

The petition, which was presented by Attorney Gorham for the club, alleged that an ordinance limiting automobiles to a speed of eight miles an hour is unreasonable and void. Affidavits were brought from several prominent Chicago men, among whom was City Electrician Ellicott, which showed results of tests made with cars a few days ago of the distances within which the machines going at different rates of speed can be brought to a standstill.

A blanket injunction was asked for which would prevent the prosecution of any case for violation of the ordinance, but the judge would comply only in the case specified.

The ordinance now pending in Joliet, Ill., is being held up to allow the Councilmen to study the regulations of other cities.

The proposed Automobile Association of Wilmington, Del., will endeavor to enforce the law against fast driving by horsemen.

Judge Sweetser of the Malden District Court, Boston, has placed himself on record as favoring a modification of the present automobile law, in regard to the speed restrictions imposed.

Reports from Boston indicate that since the recent wholesale hold-up of cars by the authorities, technical violations have nearly all been corrected and arrests for speeding are rather unusual.

H. Westervelt, of Denver, who was fined $25 recently for frightening a horse through alleged reckless driving, has appealed the case and will carry it through to the higher courts.

An ordinance has been passed in Madison, Wis., restricting the speed of automobiles to six miles per hour in the business sections of the town. Cars must also be registered and numbered.

Justice Tyson, of Lawrence, L. I., on August 30, fined Louis B. Sharp $50 for driving his car faster than the legal limit. Mr. Sharp paid the price and took a receipt for his money which he will use as evidence in a suit for damages against the village.

The Power bill, requiring the numbering of all cars, came up for its third reading before the Common Council of Nashville, Tenn., on August 25. As no provision was made for furnishing tags and numbers, it was referred to a committee for reconstruction.

An ordinance now awaits the signature of the Mayor of Kansas City to become a law. It provided for the licensing of operators by a board composed of the Superintendent of Streets and two expert automobile operators recommended by the Automobile Club and appointed by the Mayor.

D. Chambers McCan, the noted French automobile expert, now at Los Angeles, has invented a wheel for automobiles that promises to be a marvel. It does away with spokes and is made of brass and aluminum.—Boston *Globe.*

Commercial Vehicle Notes.

The Colorado and Southern Railway has placed an order with the Olds Motor Works for a track inspection car.

We are informed that R. H. Macy & Co., of New York City, have placed an order for twenty-five motor-propelled delivery wagons.

A daily automobile service is soon to be established between Durango, Col., and Farmington, N. M. The distance is 110 miles and it is expected that it will be covered in twelve hours.

The Prefect of the Department of Seine (Paris) has issued a decree, according to which persons operating motor-propelled vehicles for hire equipped with a taxameter approved by the administration, may establish a scale of rates which must not exceed the following maximum: Day rates in Paris and outside the fortifications, 25 cents for the first kilometer (.6 mile) for two-passenger car, and 10 cents for every kilometer thereafter; 30 cents for the first kilometer for a four-passenger car and 12 cents for every kilometer thereafter; for four-passenger landaus and six-passenger open cars, 40 cents for the first kilometer and 16 cents for every following kilometer. For night service an extra charge of 20 cents per trip may be made for all classes of vehicles. While the car is kept waiting or while it is running slow at the request of the passenger, a fare based on an imaginary speed of five miles per hour may be charged.

Trade Literature Received.

The Auburn Automobile Co., Auburn, Ind.—Catalogue of the Auburn 1904 gasoline cars.

Pope Motor Car Co., Toledo, O.—Booklet with brief specifications of the Pope-Toledo touring car.

T. L. Sturtevant, Harrison Square, Boston, Mass.—"How to Avoid Tire Punctures." Description of a herring-bone chain device which is dragged in front of the tires, being attached to the mud guards.

The Packard Motor Car Co., Detroit, Mich., are getting out a book containing all the details of the recent 1,000 mile record run on the Grosse Point Track in Detroit, by a Packard model L car. In addition to the time of every separate mile and the cumulative times, will be given information concerning fuel consumption, tire service, etc. The book will also contain affidavits of every one connected with the run.

Timken Roller Bearing Axle Co., Canton, O.—Circular of Bevel Gear Driving Axles.

The number of automobile licenses taken out in Paris having reached 15,000, the police find a difficulty in numbering and properly classifying them. In the alphabetical series 999 are apportioned to each letter, but if the increase continues another method must be devised.

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The Dust Problem.

In another part of the present issue we print a paper on the "Dust Nuisance" by an engineer who has given much thought to the subject, and whose efforts in this line have been rewarded with considerable success. The treatment of road surfaces for the suppression of dust is of as much interest to those living along much frequented highways, including many of our fine urban and suburban boulevards, as it is to automobilists themselves. As concerning residents in such sections the problem may possibly be solved by the aid of some of the oiling and tarring processes now being perfected; but as it concerns automobilists the problem as such must be attacked differently if substantial results are to be obtained. Too much road building still remains to be done for any thought to be given to applying dust treatment to country roads. Only dust-preventing means associated with the car itself can be considered.

There are several causes for the raising of dust by fast moving vehicles. In the first place, any irregularity in the under surface of the cars causes air currents to impinge against the road surface as the car moves along, thus stirring up the dust. An instant later a vacuum is formed by the back of the car, over the spot where the dust has thus been raised from the road surface, and the dust cloud is carried upward behind the car to fill this vacuum. This effect is particularly pronounced in cars having gasoline tanks, tool boxes, etc., projecting below the frame of the car at the rear, leaving a very small road clearance, as is the case in some large touring cars. These parts not only strongly deflect the air underneath the car against the road surface, but add to the extent of the rear surface of the car, thus increasing the vacuum formed. In some American runabouts with slanting rear body, this cause of dust raising is practically absent, but wherever these conditions exist, the most obvious remedy consists in providing means of filling in the vacuum back of the car with air from the side or top, and such means, consisting in deflectors attached either to the side panels or the top edge of the rear seat, are already offered in the market.

Another method of preventing dust from rising at the rear of the car, is to create a strong backward blast underneath the car, preferably at the rear. The muffler discharge serves this purpose well, especially in a four-cylinder motor, which is the type most generally used on large touring cars. If the discharge is made at the rear of the car, is inclined slightly downward, and is divided into a number of streams, three or four, it will be very effective in preventing dust from rising above the back seat and annoying the occupants. Some manufacturers employing a very strong radiator fan, claim that the blast of air sent back underneath the body by this fan has the same effect and almost entirely obviates the dust nuisance.

Opposition of the Hack Drivers.

During the past year several automobile lines for sight-seeing purposes have been established in New York City, and, charging a fare of $1.50 or $2, have apparently done a flourishing business. Their apparent success, it seems, has aroused the envy of the hack drivers of the metropolis, for on September 8 a driver for one of these lines was arrested on complaint of the president of the Public Hack Drivers' Association for operating a stage line in violation of sections 1,458 and 1,461 of the City Charter, which provide that no one shall operate a stage line without a franchise, and that no such license shall be granted by the Board of Aldermen unless a majority of real estate owners along the

proposed route give their consent. The Magistrate before whom the case was tried discharged the arrested driver, but ordered the company to comply with the requirements of the Charter.

The question involved is whether an automobile sight-seeing service can properly be described as a public hack line, and is of general interest, in view of the establishment of many such services throughout the country. It will be remembered that there was also interference by the hack drivers when, about two years ago, a line of steam buses was established between some of the downtown ferries. The manager of the line then denied that it was a stage line he was operating. The line went out of business a short time later, and the question was never definitely decided, we believe.

Probably the majority of property owners would be glad to give their consent to these sight-seeing services, as they are a convenience to many out-of-town visitors who come here wholly or in part for pleasure purposes, and thus tend to draw visitors to the city. It would be a most difficult task, however, to petition all the property owners along the routes over which these vehicles run, hence it is to be expected that the companies attacked will appeal and carry the case to a higher court before accepting the ruling that they must comply with these sections of the City Charter. At present these busses are licensed only under the New York State automobile law, carrying the same license number plates as other automobiles.

Fall Touring.

No doubt many extended tours during the past Summer were spoiled by the rains which occurred every few days during June and July. During August the weather was on the whole fair, and those who made tours during that month found nothing to regret because of weather conditions. In many respects the best season of the year for touring is just now beginning, for during the early Fall, when the forest trees begin to turn in color, the country is not only very inviting, the atmosphere as a rule clear, and the air bracing, but the common dirt roads are also in much better condition than earlier in the year. Nevertheless, it appears from our correspondence that there is much less long distance touring at this time of the year than earlier in the season. The reason probably is that after being confined indoors more or less during a long winter, people long to enjoy the open air as soon as weather conditions permit and the roads have dried up. Many tours are planned long in advance, during the winter months, and started upon as soon as feasible, sometimes to the regret of the tourists. Then, too, Summer is the traditional vacation season when business men in nearly all lines are better able to get off than in the Fall. Aside from these considerations, however, Fall touring has everything to recommend it, and ought to be encouraged.

A first-season automobilist receiving his car in the Spring will be well advised to postpone prolonged trips until near the end of the driving season, not only to first gain experience in skilfully handling his car, but also to become familiar with its more common mishaps and their detection and cure. Of course, this does not apply to the professional driver.

Theory of Muffler Construction.

There is perhaps no part of a gasoline automobile the principles of design of which have undergone such a complete change, not to say reversal, as have those of the muffler. The general conception of an efficient muffler a few years ago was a sheet metal vessel with several compartments of graduated size, and with communicating passages between the compartments of a cross-sectional area each in proportion to the volume of the compartments connected, the burnt gases from the engine being led into the smallest compartment and discharged to the atmosphere from the largest. Muffler manufacturers often claimed as a point of superior construction that the successive contracted passages through which the exhaust gases were led were each larger in area than the cross-section of the exhaust pipe. At present, in the most advanced designs of mufflers, the discharge passage to the atmosphere is smaller in cross-section than the exhaust pipe, and if the muffler has several compartments, the gases are led from the engine into the largest of these and allowed to expand, and are then passed on through the smaller compartments. Evidently there is less back pressure on the piston if the exhaust gases are allowed to expand in a large chamber directly they issue from the cylinder, than if passed through a number of communicating small chambers before reaching the large expansion chamber. The object of using more than one compartment is to obtain additional means of throttling the gases, which are provided by the small perforations in the walls between compartments, and there is therefore no object in making the compartments beyond the first large expansion chamber, of great volume.

Responsibility of Owners.

Magistrate Cornell, of New York, who recently discoursed on the propriety of using shotguns on speeding automobilists, has been heard from again on the speed question. A case came up before him last week in which a hired chauffeur had been arrested for running at a speed of 25 miles an hour in the central portion of the city. The Magistrate learned that the owner of the car had accompanied his chauffeur to the police station and deposited the cash bail required, and this led him to say that it would be much better if the owner himself were arrested, and, perhaps, committed to prison, in case of repeated offenses, as this would surely have a salutary effect on all such offenders. As things stand now, the owner is simply put to the slight inconvenience of appearing in court and paying a small fine. The Magistrate reiterated his statement, recently made, that he does not believe in shooting at reckless automobilists, but expressed himself to the effect that when the owner is present in a car that has been stopped for illegal speeding, he rather than the chauffeur should be arrested.

Much has been written regarding the speeding proclivities of professional chauffeurs, and occasionally the opinion has been vouchsafed that they are responsible for nearly all the reckless driving indulged in. Undoubtedly there is some foundation for this view, though to some extent it may depend upon the fact that professional drivers have less "stand in" with newspapers than their employers. Professional drivers are only employed for large cars, with which most of the speeding is done, and, besides, many cases are on record of professional chauffeurs being arrested for speeding while taking their friends out in machines without their employer's knowledge or consent. In any such case, of course, absolutely no blame attaches to the owner. But if the owner occupies a car which is being driven beyond the legal limit, in practically every case it is by his special order, and he is therefore morally responsible for the offense. At present the law does not take this view, but holds the driver responsible. A revision of the different automobile laws

in this respect so as to place the guilt where it properly belongs would be desirable and have a salutary effect on reckless speeding in general.

Peculiar Cause of Night Collision.

A rather peculiar accident occurred in New Jersey one night last week, a touring car running at high speed colliding with a horse wagon head on, for the reason that the horse driver mistook the car, whose two side lamps were lit, for two bicycles, and decided to drive between them, keeping to the middle of the road. Apparently the car was not adequately lighted for night driving, especially at high speed, or else the horse wagon, whether lit or unlit, should have been noticed in time by the automobile driver to allow the car to be stopped before the collision occurred. Then, too, the car being driven by a woman, it is possible that when she suddenly saw the horse wagon loom up out of the darkness, she lost her head and forgot to put on the brakes.

The horse driver was evidently to blame for keeping in the middle of the road, as even if two bicycles had been approaching, as was his impression, it would have been his duty in accordance with the road laws, to keep to the right. Similarly the automobilists should have kept to their side of the road.

The feature of the accident from which possibly a useful lesson may be drawn, is that, owing to the arrangement of the lights, the car was mistaken for two bicycles. A similar case occurred in Providence, R. I., some years ago, when a bicyclist rode straight into a car from in front. Such a mistake would be impossible if only a central headlight were lighted, or three lamps, one centrally in front and two at the sides, respectively. The trouble with the lights on an automobile is that the rays do not fall upon any part of the car, and therefore do not give travelers in the opposite direction any idea of what is behind the light. In a horse vehicle, for instance, the lights are behind the horse, and the outline of the latter is visible to travelers in the opposite direction at a considerable distance, depending upon the power of the lamps. Greater safety in night traveling may possibly be secured by reproducing this condition in automobile traffic.

The first and foremost condition of safety in automobile driving at night will, however, always be to drive slowly and keep the car well in hand, so that if any obstruction looms up unexpectedly, the vehicle can be brought to a stop before a collision occurs.

Locating and Remedying Spark Troubles.

By Albert L. Clough.

The chief difficulty experienced in the location of defects in jump spark ignition systems arises from the fact that derangements in different portions of the circuit make themselves manifest by the same symptoms—usually a failure of the primary current to flow, or a cessation of the igniting spark. If each possible derangement had its own individual symptom, "trouble hunting" would be comparatively easy, but, as the matter actually stands, there is more or less groping and experimenting to be done in a somewhat haphazard way, in order to find which one of the many possible causes of trouble is the one that is present. It is impossible to define any method of procedure in the localization of ignition defects, which shall prove infallible or which is better or quicker than some other, but the following routine is suggested as having been fairly successful in practice.

CLASSIFICATION OF CAUSES.

(A) Take the case of a failure of the primary current as shown by the lack of action of the coil vibrator when the engine is turned over the sparking point, or the lack of a spark at the switch when the engine is placed on the ignition point and the switch contacts are opened and closed. This may be due to any one of three causes. (1) The battery may have failed; (2) there may be a break or unreliable contact somewhere in the primary circuit, or (3) there may be a short circuit in the primary which allows the current to take a short cut without passing through the coil.

RESERVE BATTERIES.

(1) Every car ought to carry two distinct sets of battery, one of which should at all times be kept fresh and in perfect condition. If this is the case, the act of switching to the reserve battery will demonstrate at once whether or not the difficulty is one due to weak battery power. If ignition is immediately resumed after switching over, the trip can, of course, be completed with the good battery, but one should not neglect to replace the defective one at the very earliest moment. In case, through any neglect, neither battery is known to be in perfect order, or in the very rare instance of but one battery being carried, rough tests of battery strength may be made. A piece of wire a couple of feet long may be taken and its ends momentarily touched to the free zinc and carbon terminals of the battery. If the cells are in good condition, the flow of current ought to be enough to make a bright spark sufficient to cause the end of the wire to smoke. In case no spark is obtained in this way, or only a very feeble one, the battery may be considered as imperfectly contacted or weak.

If there is no spark at all, it may be that some individual cell is internally open circuited, or that the wire connecting some cell with its neighbor has been broken or makes a bad connection in its binding posts. Wire sometimes breaks and is held from falling apart by its covering. Such a break may sometimes be located by bending the wires in various directions by the hand and if a particular point in the wire is noticed which seems especially flimsy, the conductor may be broken. It will naturally occur to one to tighten all binding posts and to look especially for any sign of corrosion around the connections, which, if found, should be scraped off and clean connections made. If the battery still fails to give any current whatever, the engine should be set on the sparking position, and one should take the test wire previously alluded to and search for the break in the circuit, by touching its ends simultaneously to the two terminals of each cell, thus cutting it out of circuit. If the particular cell which is thus being tested be the offending one, there will be a spark at one or the other end of the test wire. By simultaneously touching the ends of the test wire to adjacent terminals of neighboring cells, each connecting wire between cells may be successively cut out of circuit, and if the break be located in one of these, a spark will occur at the test wire when it is applied.

VOLTMETER TEST.

In the event of the battery's giving a weak spark when tested as a whole, it will probably have to be condemned, but if one has a pocket voltmeter at hand, it may be worth while to set the current flowing by putting the engine on the spark point and, while in this condition, testing the voltage of each cell successively by attaching the two terminals of the instrument to its carbon and zinc terminals successively. If any one cell shows a voltage very much below the others, it may be cut out of circuit with good results. Should no particular cell be found weaker than the others, the battery will have to be given up as useless.

PARALLELING BATTERIES.

If both batteries of the car are found hopelessly weak, as a last resort they may be connected in parallel, thus demanding only half the usual flow of current from either one. Sometimes one can get home through resorting to this expedient. As usually arranged, a wire leads from the free zinc terminal of each battery to one of the two points of the switch, and the free carbon terminals of the two sets are wired together, or it may be that the polarity is just the reverse. In either case, a wire connected to the two battery terminals from which run the wires to the two switch points, will put the two sets in parallel. Some cars have switches which provide special means for paralleling the two batteries.

FAULTS IN SPARK GENERATORS.

Should the source of current be a

dynamo or magneto, and no auxiliary battery be carried, the usual cause of non-generation of current is a faulty contact between the brushes and the commutator. The commutator should be cleaned with waste moistened in gasoline, the brushes removed and their working ends treated in the same manner. Sometimes, the brushes fail to feed as they wear, owing to lack of stiffness in their springs or to their sticking in their holders. They should be pressed firmly upon the commutator and the engine cranked. The contacts upon the generator should be tightened, and the lead wires searched for breaks.

(2) A break in the continuity of the primary circuit may occur at any one of the following points: (a) at the timer; (b) at the vibrator (if one be employed); (c) in the primary winding or connections; (d) in the battery switch; (e) in the wiring.

DEFECTS IN TIMERS.

(a) Timers are usually of either the platinum contact type or of the commutator and brush type. The former, which consists of a cam actuated spring or "feather" carrying a platinum contact which is brought into connection with a platinum tipped screw, is a particularly sensitive little device. The wise motorist will carry a spare spring and a spare contact screw, which he can at once substitue for the ones which he has been using, and thus determine whether this is the seat of the trouble. In case these spare parts are not at hand, one may test the timer by throwing on the battery switch and simultaneously touching with the two ends of the test wire the binding screw of the timer and the timer shaft, or some part of the engine. This should cause a spark at the test wire and a buzzing of the vibrator if the trouble is in the timer contacts. With a multiple cylinder engine, each timer binding post may be tested in this manner.

POOR CONTACTS.

When the engine is cranked over, the timer contacts should be seen to press firmly together at the correct point and separate to the proper distance. Sometimes a gage for resetting the points, as they wear away, is provided by the manufacturers. The platinum points after considerable usage wear out flat and the contact surface becomes spongy, rough and nonconducting. A very fine flat file will serve to clean and smooth these contacts which should be left flat in order that the two platinums may meet over their whole surface. The screw and spring should be removed from their places, in order to do this work properly. Some platinum points are so hard that a file will not "touch" them, and in such cases emery cloth carried upon a file or other flat surface should be used for smoothing them. Very rarely the soldering of platinum points to their supports gives a bad contact after long *use.*

Occasionally the steel spring or "feather" will develop a hidden crack which will render its conductivity uncertain but perhaps not cause it to break completely for some time. The attachment of the spring to its support may not make a good contact, especially if the screws be a little loose, or if oil has worked in behind it. Occasionally the platinum tipped screw may make a poor contact in its post, due to the loosenes of its clamping screw, or oil or dirt in its threads. Sometimes, instead of employing platinum-tipped steel springs, the moving contact is carried upon a pivoted brass arm. If the pivot is depended upon to preserve the contact, trouble is likely to arise from looseness developing there. In this construction the spiral springs which actuate the brass arms, help to carry the current. The attachment of the wires to their binding posts should be demonstrated to be clean and firm, and the timer must not be loose enough on its shaft to allow any possibility of its motion breaking the ground connection.

DIRTY CONTACT SURFACES.

In the commutator and brush type of timer, a moving brush or roller travels over the internal surface of an insulating cylindrical shell having contact segments set into its surface at proper intervals, for each cylinder to be sparked. These timers are not very prone to failure, but occasionally the stationary contacts may become fouled with dirty oil or metal dust, or worn down below the surface of the insulation. In the latter case, the insulation will have to be turned or filed down to make the surface true. The spring which forces the moving brush or roller into contact with the segments, must be of the proper tension to secure positive action. Dependence upon pivots to carry the current may properly give rise to suspicion. All binding posts should be tried for tightness. A timer which is "wobbly" upon its shaft is almost sure to give trouble, especially at high speeds, and should be repaired so as to run true.

COIL VIBRATORS.

(b) The coil vibrator is rather a troublesome little piece of apparatus. To determine whether it is at fault, carefully place the engine on the sparking position, and with the test wire, simultaneously touch the support of the vibrator and the arch which carries the adjusting screw. If a spark be obtained, the trouble is in the vibrator contacts or in their adjustment. The adjusting screw is easily removed and its platinum smoothed up, as explained under the subject of timer contacts. If the vibrator itself can be removed from its back support without breaking the soldering which is sometimes used, this should be done, and its contact put in condition. If it cannot readily be taken off, it may be smoothed by a thin file and emery cloth. The screws which hold the vibrator to its back support should be tight, and the adjusting screw should be left firmly clamped in its thread by means of the set screws usually supplied.

VIBRATOR ADJUSTMENT.

Vibrator adjustment is a matter of experiment. Two screws are generally (but not always) provided for this purpose: One which determines the upward spring of the vibrator and the other the platinum-tipped contact screw. In general it may be said that the spring adjustment should be so set as to cause the vibrator to make a positive contact between the vibrator and the contact screw to insure the electric circuit, but it should not have an excessive tension, as then the electro-magnetism of the core may be insufficient to draw it down and cause vibration. The nearer the position of rest of the vibrator is to the core of the coil, the stronger will be the field, and the spring adjustment should be so made as to take account of this.

The engine should be set upon the sparking point, the switch thrown on and the contact screw turned back and forth until the buzz of the vibrator is energetic and gives forth a perfectly even sound of somewhat high pitch. The adjustment may be tested by opening and closing the switch very rapidly with the engine in the sparking position. If the vibrator responds infallibly to instantaneous contacts of the switch, it will probably work properly even at high engine speeds.

A GOOD METHOD.

A good method of vibrator adjustment is the following: Take the secondary wires out of their connections to their plugs, and place the ends of each of them about a quarter of an inch from some part of the engine or engine frame. Then adjust each vibrator until the secondary discharge will set on fire in the shortest length of time a sheet of tissue paper held between its secondary wire and the engine. If a spark will light tissue paper almost instantly, it may generally be relied upon for ignition of the charge.

(To be continued.)

That Gordon Bennett Deficit.

At a meeting recently held at Frankfort-on-Main, to consider the report of the financial committee of the Automobile Club of Germany by subscribers to the guarantee fund of the International Cup race, it was decided to pay the deficit of eighty per cent. The Automobile Club undertook that any profits made by any future undertakings are to be handed over to the guarantors. It was further agreed that if the International Cup race of 1906 be run in Germany and result in a financial surplus, this will be paid into the guarantee fund. The Germans have found to their sorrow that automobile racing as a field for investment is not what it is cracked up to be.

Rear Axle Construction.

By Julian C. Chase.

construction of the rear or driving a car is largely determined by the arrangement of the other essential .ny of the three most common meth- driving, viz.: by bevel gear, single nd side chain, having sufficient merit :e the question of choice between ·f secondary importance. The type or to be used, its position in the l the style of transmission employed, the main, the factors which de- : the kind of axle fitted to the car.

is country, the horizontal engine lo- n the body of the car, and the use of the planetary transmission sys- ıve been so common until now, as e the use of the single-chain-driven le considerably more general than : of either of the other two types. ason why this combination of parts :n so largely employed is that it has ɔ commend it on the score of cheap- manufacture. Then, too, it is pos- ıat the various parts makers have ıore attention to the manufacture of cial parts required for this construc- nd these parts are therefore more obtained by the smaller manufac- who do not as yet produce them- all of the detail parts which go to ıp the completed car.

construction of a live driving axle s many mechanical problems. Allow- ust be made for bending strains due weight of the car and the weight of e itself; for the torsional strains of and for the end thrust of the gears, l gears be used; or side thrust, if a r spur gears be used to transmit the power to the axle.

e earliest examples of live axle con- n, no attempt was made to separate various strains. The shafts which tted the driving power to the wheels so called upon to support the weight vehicle, and in some instances to nd the bending strains caused by the the driving chain as well.

HISTORICAL DEVELOPMENT.

original practice was to revolve the ıxle in two bearings, one under each support, the wheels being attached to the revolving shafts, one of passed through the differential gear r a short distance into a socket in the inside end of the other. A o which was attached the distance · the driving chain, passed around erential and held the whole together. became evident that this construc- d not afford sufficient strength to he sagging strains caused by the of the vehicle as it passed over un- round. The first improvement in ign had for its object to obtain in- structural strength. A solid shaft ı from one road wheel to the other, this shaft were secured one wheel and one side gear of the differential, while to a sleeve surrounding the shaft at one end, were attached the other wheel and the opposite side gear of the differential. This construction offers the advantages of a solid, one-piece axle and is used to-day on a few cars. The torsional and bending strains are still combined in the driving shaft, but the resistance to sagging has been materially increased.

SEPARATION OF STRAIN.

The next step in the development of the live driving axle was the partial separation of the torsional and bending strains. This was accomplished by running both driving shafts through tubes supplied with two bearings each (one at each end) and held together by a double yoke and truss members which passed around the differential. The outer ends of the driving shafts projected from the tubes and had keyed to them the driving wheels, and the weight of the vehicle was therefore held by them. This construction, as has been said, only partially relieves the driving shafts of the bending strains. It shortens the leverages through which these forces act, and the portions of the tubes between the bearings reinforce the shafts, which two effects combined make it possible to use shafts of smaller diameter for a given torque to be transmitted and weight of car.

The truss construction has been modified and the yoke has given way in some instances to the divided, watch-shaped case, but otherwise the same general features are retained in the axles most commonly used to-day on light cars of American manufacture. If bevel gears are used to transmit the driving power to the axle, there is required a stiff case about these gears, capable of withstanding the end thrust and of maintaining the proper relationship between the various shafts, so that the gears may mesh properly at all times. A case of sufficient strength is likely to be of considerable weight, and this added weight in the center of the axle becomes a feature for further consideration of the designer. Combined lightness and strength in this part are of vital importance. Excessive weight not only calls for an excess of strength beyond that which is necessary to carry the weight of the car and to transmit the driving power, but also throws additional uncushioned weight on the tires of the driving wheels. The problem involves the careful selection of material and its most effective distribution.

BEVEL GEAR AXLES.

The general practice to-day in the construction of bevel gear driven axles is to enclose these gears and the differential in a cast metal case, divided either horizontally or vertically. Into each side of this case is secured a steel tube which extends out to each driving wheel and carries the bearings for the driving shafts. Each of the driving shafts is passed through one of the tubes and has secured to it one of the driving wheels and one side gear of the differential. The various details, such as the style of bearings used and their adjustment, the method of taking up the end thrust of the driving gears, and the manner in which the various gears and the driving wheels are secured to the shafts, are worked out in any of a large number of different ways, the degree to which theoretical perfection is attained depending largely upon the selling price of the car.

Up to within a year or so, the tendency among the builders of the more expensive cars was to divide the central case of the rear axle vertically. The difficulty of getting at the driving gears and differential, for purposes of inspection or repair, is so great with this construction that many of these makers have adopted the horizontally divided case, which, though possibly somewhat heavier, offers the advantage of ready inspection of the gears by simply removing the upper half. It is not necessary to "take down" the whole axle, as with the other type of case.

PRESSED STEEL-ALUMINUM CASE.

A radical departure from current practice, which is interesting because of the lightness and strength obtained, has recently been patented by a prominent foreign builder. In this case, an aluminum ring surrounds the differential and the driving gears. Funnel-shaped stamped steel members having an angle of incline of about 45 degrees are forced on to the axle tubes in such a manner that flanges formed on their larger ends come against the outer edges of two steel disks which fit over the inner ends of the axle tubes and against the edges of the aluminum ring. Long bolts pass through flanges, disks and ring, and hold the whole together. In this construction the aluminum, except at the bearing for the bevel driving pinion, which is formed in a projection at the forward part of the ring, is subjected only to strains of compression. The bolts at the bottom receive the tensile strains and those at the top to a large extent reinforce the aluminum. The stamped steel members, because of their shape, can be made very thin and will give remarkable strength for their weight.

So far we have discussed axles in which there is at most only a partial separation of torsional and bending strains. On a few cars, of both foreign and domestic manufacture, are to be found live driving axles in which a complete separation is effected. This is accomplished in either of two ways. In the first, the bearings for the driving wheels are located on the ends of the axle tubes which pass through the hubs. These tubes and the central case are therefore practically a hollow stationary axle supporting all the bending strains due to carrying the weight of the vehicle. The driving shafts deliver the propelling power from the differential gear to the driving wheels by means of jaw clutches formed on the outer ends of the shafts and on the outside

of the hubs. These shafts are not called upon to support the weight of the vehicle in any way.

The other method of obtaining this complete separation amounts practically to the same thing, but is worked out slightly differently. In this case, the wheels revolve on the ends of a solid axle. This axle is bent so that it will pass around a case containing the driving gears and differential, which is secured to it. The driving shafts pass from this case to the wheels and either pass through sleeves formed on the ends of the axle proper and connect with jaw clutches to the wheels, as in the case above, or they drive these wheels through a pair of spur gears. It will be seen that in this construction the weight of the car is carried by the solid axle, and only the torsional driving strains are thrown upon the driving shafts.

PRESENT PRACTICE.

The preponderance of practice seems to favor the partial separation merely, but it is doubtful if this construction can be successfully defended against the theoretically more correct. The type now more commonly used depends for its successful operation to a greater degree upon careful workmanship, and nice fits and adjustments, especially as the weight and power of the car increase. With the other construction, it is possible to use universal joints or their equivalent at the ends of each driving shaft, and the necessity for an absolute alignment of the four bearings does not, therefore, exist. There is also, in this case, no likelihood that the differential gear will be subjected to sagging strains. A larger hub is required on the driving wheels, but with carefully worked out details, this need not detract in the slightest from the appearance of the car. All things considered, it would seem that the balance of general practice is bound to swing, sooner or later, from the common practice of to-day to the theoretically more correct.

AXLE STATISTICS.

The preponderance of the centre-chain-driven live axle over the other types used on American-made cars is shown by a

	Single chain. No.	%	Gears. No.	%	Side chains. No.	%	Totals.
Class A, $500-$1,000...	20	74%	7	26%	0	—	27
Class B, $1,001-$1,500.	22	80%	3	12%	2	8%	27
Class C, $1,501-$2,000.	5	50%	3	30%	2	20%	10
Class D, $2,001-$2,500.	2	28%	5	72%	0	—	7
Class E, $2,501-$3,000.	0	—	4	66%	2	34%	6
Class F, $3,001-$4,000.	1	11%	4	44½%	4	44½%	9
Class G, over $4,000..	0	—	6	43%	8	57%	14
Totals	50	50%	32	32%	18	18%	100

glance at the accompanying table, which is an analysis of 100 models of manufacturers who have attained to any degree of prominence in the trade. Of these cars, 82 per cent. use live axles of some form, while only 18 per cent. use stationary axles and apply the driving power directly to the rear wheels by means of separate chains. *Among those which* use the live axle, the *driving power is applied to the driving* shafts in 39 per cent. of the cases by a pair of gears and in 61 per cent. by a single chain. In exactly 50 per cent. of the 100 models considered, the latter type of drive is employed.

The relationship of selling price to design is also shown in the table, the cars having for this purpose been divided into seven classes, A, B, C, D, E, F and G. It will be seen that more than half of the models, or, to be exact, 54 per cent., sell for $1,500 or less. The number of cars in each class falls off persistently until a selling price of $3,000 is reached, and from this point there is a reaction, as it were, until in class G (cars selling for more than $4,000) we see a greater number of different models than in any other class above the $1,500 mark. These observations may be somewhat beside the issue, but seem to be of sufficient interest to deserve at least a passing mention.

Of the twenty-seven cars in class A, 74 per cent. make use of the single chain drive and 26 per cent. of the gear drive; there being none with side chains. As the price increases, there is a general falling off in the percentage of single-chain-driven cars, until the $2,500 mark is reached, at which point, except for the single model in the $3,000—$4,000 class, it entirely disappears. The instance noted is merely the exception which proves the general rule, that as the price increases the use of the single chain decreases and that this form of drive is not to be found in cars selling for more than $2,500. The use of the gear-drive gradually increases with the price up to the point at which the single chain disappears, and then as steadily decreases as the price goes up.

Starting at 8 per cent. in class B, the car with the side chains shows an increasing percentage until in class G it reaches the maximum of 57 per cent. A point not shown by the tables is that in both the lowest and the highest priced cars made in this country the driving power is applied to a live axle by means of a pair of gears.

While in the lower priced cars the selling price practically restricts the maker to the cheapest combination to manufacture, there are other things which have a direct bearing upon the design, the effects of which become more pronounced as the price increases. Horse power, weight and speed increase with price, and these enter with proportionately increasing importance into the problem as a whole, so that what would be the more mechanically correct construction in one class of car, might, through the complication of the problem of design, become somewhat less so in a larger, faster and more powerful machine. We have in mind the live driving axle, and especially the bevel gear type.

The table shows a drop from 26 per cent. in class A to 12 per cent. in class B in the frequency with which this type of axle is used, and a corresponding rise from 74 per cent. to 80 per cent. in the use of the single chain drive. To make these differences consistent with what has been said before in regard to the general run of practice in the use of these two constructions, it should be explained that the large number of cars with bevel gear drive in the first class is due to the fact that a number of manufacturers have put on the market a low priced car of French type, i. e.; having a vertical engine under a bonnet in front of the dash and a propeller shaft drive to the rear axle; and that as these cars are of small power and weight, a sufficient degree of mechanical perfection can be secured without any marked increase in cost of manufacture.

As the weight, power and speed increase, the construction of a satisfactory bevel gear live axle involves greater mechanical accuracy and perfection of design. So long as the conditions entering into the problem of design permit of a ready solution, there is a steady increase in the use of this type of axle along with the increase in the selling price, but as the problem becomes more involved, there is a tendency to depart from this construction and adopt side chains.

No Road Rights, No Church Contributions.

The automobile owners staying for the summer near the beautiful Attersee, in Austria, have been at loggerheads with the local authorities. One day a car killed a dog belonging to the priest at Steinbach, one of the villages on the lake. The priest immediately summoned a meeting of the village council, and it was resolved, in virtue of the powers recently given to the local authorities by the Austrian Government, to prohibit automobiles from passing through the village, and notice-boards were posted accordingly.

As this measure prevented the owners of cars from using the road running round the lake, they in their turn issued an ultimatum to the village elders: "No automobiles, no subscriptions to the church and local charities." The prohibition was thereupon withdrawn, but only in favor of the owners of cars who live in the neighborhood; and it still remains in force as regards strangers.

The effect of the arbitrary powers of blocking roads to motor cars now possessed by the local authorities may also be seen at Hallstadt, the so-called "pearl of the Salzkammergut," which is now unapproachable by self-propelled vehicles, as the use of both the roads leading to the place is prohibited.

It is announced that the Pope Motor Car Co. of New York City have reduced the price on their Pope-Hartford touring car with tonneau from $1,200 to $1,000, and that of their Pope-Tribune runabout from $650 to $500.

New Vehicles and Parts

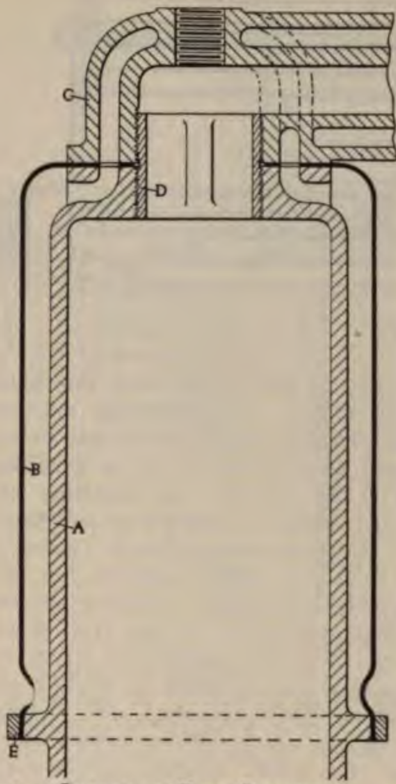
The Ford Four-Cylinder Touring Car.

First to be completed of the several moderate-priced four cylinder touring cars to which we referred in our last issue is that of the Ford Motor Company, of Detroit, Mich. The general features of this car are a four cylinder, vertical, copper-jacket motor carried in front; a two-speed and reverse planetary change speed gear; bevel gear drive, with a special sys- cial system of driving-thrust transmission from the rear axle to the running gear frame, relieving the rear springs; an improved spring suspension system; a one-part, drop-forged front axle, and unusual simplicity of construction.

THE ENGINE.

The engine cylinders are cast separately, and consist of a plain cylindrical casting with an outward flange at the lower end to secure them to the crank case, and a slightly rounded head at the top. Each cylinder is of four inches bore and five inches stroke. The combustion chambers are separate castings, completely water jacketed, and are secured to the cylinders proper by means of a nipple with right and left hand screw threads. These nipples have an opening through them of 1¾ inches diameter, and are provided each with two opposite internal longitudinal flanges to take a wrench of special form. These nipples screw into threaded openings in both the cylinder head proper and in the combustion chamber, and form the only means of securing the combustion chamber to the cylinder. The two parts are connected before the cylinders are fastened down to the crank case.

The jacket is of drawn copper, and is secured to the cylinder casting in a novel manner. The lower end of the copper jacket is slightly contracted, and the upper end is formed with an integral head with



Sketch of Ford Cylinder.
A, cylinder casting; B, copper jacket; C, combustion chamber; D, nipple; E, steel ring;

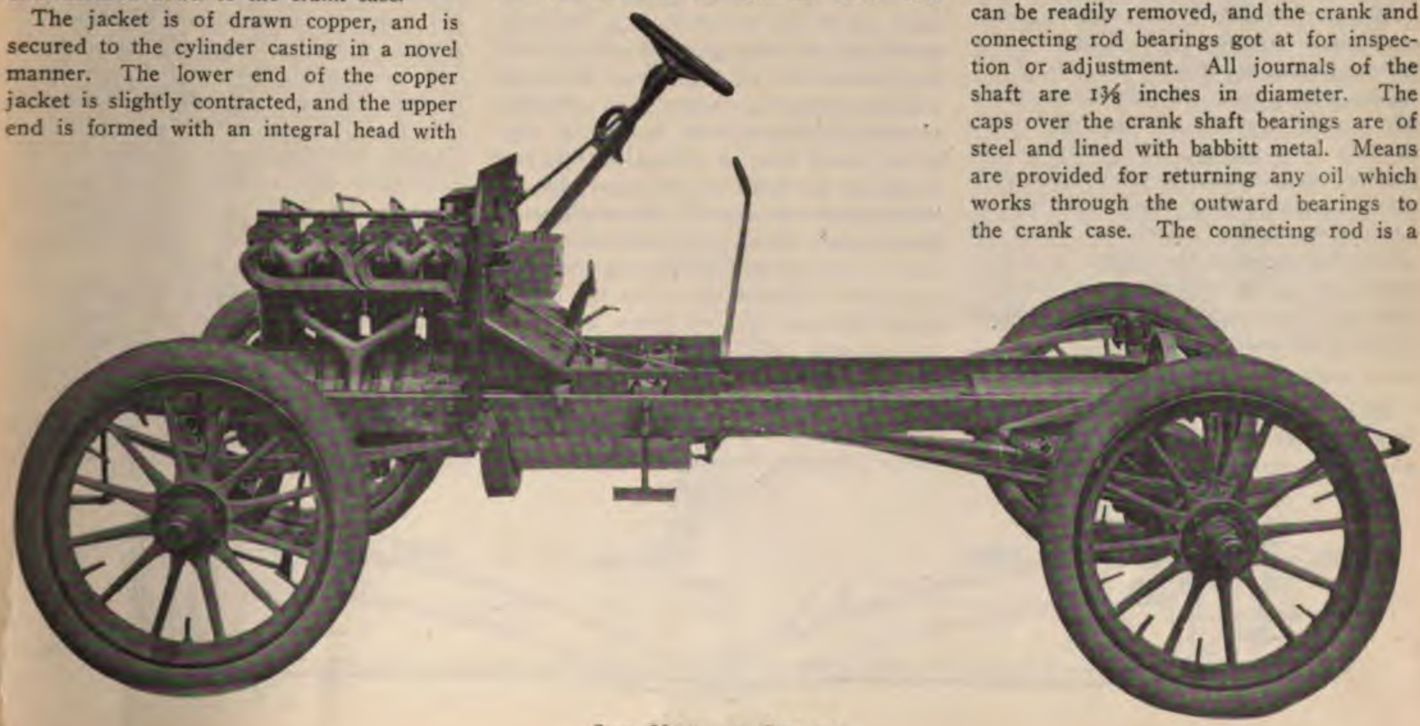
a hole in the center for the passage of the right and left hand nipple. The cylinder castings are formed with a circumferential flange on the outside at the bottom of the jacket space, and the contracted end of the copper jacket is forced over this flange, which has first been turned down in a lathe, and a tight-fitting steel ring is then pressed over the end of the copper jacket. The head or upper end of the jacket is clamped between the cylinder head and the combustion chamber, passages being cut in the three contacting parts to place the jacket space around the cylinder and the jacket space surrounding the combustion chamber in communication. Each cylinder is secured to the crank chamber by four 9-16 inch bolts. Two dowel pins are used to prevent dislocation of the cylinder on the crank case, and dowels are also used between the cylinder and head.

The crank case is cast of aluminum, in two halves, with a horizontal joint through the centre of the crank shaft. The upper half is cast with four integral feet, by which the engine is supported on the frame.

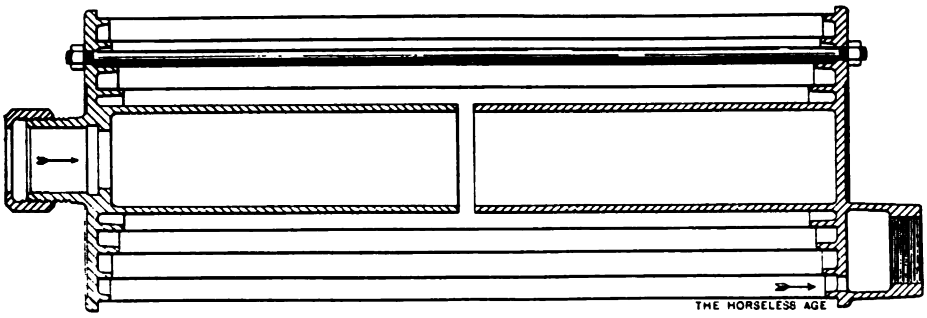
Both the inlet and exhaust valves are mechanically operated, and are located side by side in the valve chamber formed integral with the combustion chamber. The valves are of 1⅜ inches clear diameter, have 45° seats, and are interchangeable. The valves are lifted from their seats, against the pressure of the usual coiled valve springs, by means of cams, cam followers guided in brass bushings in the wall of the crank chamber, and intermediate push rods of unusual length. Shallow holes are drilled into the lower end of the valve stems and the upper end of the cam followers to receive the ends of the push rods, this being the only means of holding the latter in place.

The piston is of the usual construction, having four compression rings, three above the piston pin and one below. The rings are made with an oblique slit, and are ground to size under compression.

The crank shaft is a drop forging, and has five bearings, which are entirely supported by the upper half of the crank case, so that the lower half of the case can be readily removed, and the crank and connecting rod bearings got at for inspection or adjustment. All journals of the shaft are 1⅜ inches in diameter. The caps over the crank shaft bearings are of steel and lined with babbitt metal. Means are provided for returning any oil which works through the outward bearings to the crank case. The connecting rod is a



Side View of Chassis.



FORD MUFFLER.

drop forging of I section, and is provided with means for adjustment at both ends. The upper or piston end bearing is bushed with bronze, and the lower end has a babbitt lining. The cap at the crank end is hinged to the rod at an angle of 45° to make it more accessible when the lower half of the crank case is removed. To the forward end of the crank shaft, just inside the outer bearing, is secured the steel cam shaft pinion, and the extreme end of the shaft is cut with ratchet teeth to take the starting crank. The cam shaft, with its cams, is entirely enclosed within the crank casing, and the valve operating mechanism works therefore to best advantage as regards lubrication, etc. The cams are of steel, hardened and ground, and are securely pinned to the shaft. To the rear end of the crank shaft is keyed the 18-inch flywheel, which is formed with a flange to bolt the transmission shaft to. From the rear end of the cam shaft is driven a vertical shaft through a pair of enclosed spiral gears of equal number of teeth. This vertical shaft drives both a mechanical lubricator (Lunkenheimer), secured to the dashboard, and the ignition timer (Herz), which is located at its upper end.

All four cylinders are supplied with combustible mixture by a Kingston carburetor located at the left hand side of the engine crank case. An aluminum manifold casting connects the carburetor with all four inlet valves. The carburetor is provided with a throttle valve which connects directly with a small lever underneath the steering wheel, by means of which the speed of the engine is largely controlled. The carburetor is supplied with fuel from a 15-gallon tank arranged in the front seat.

IGNITION.

Ignition is by jump spark, with a separate coil for each cylinder. The spark plugs are screwed into the combustion chamber on top, in line with the center of the cylinders. Huff vibrator coils are used, and are carried at the side of the bonnet, being protected by an aluminum case. The current for operating the ignition system is furnished by an "American" three-cell storage battery carried in the front seat. The timer, the last part of the ignition system, is carried just underneath the bonnet at the rear of the engine, where it is located very handy for inspection, and protected from dust and moisture. It is connected with a spark timing lever on the steering column underneath the wheel, arranged symmetrically with the throttle lever.

COOLING SYSTEM.

The cooling system comprises a Whitlock cellular radiator with fan, a gear pump, the jackets and connections. The radiator forms the forward end of the bonnet. The fan is carried in a bearing supported by braces secured to the radiator, and is driven from the forward end of the crank shaft by means of a coiled steel wire belt, at an increase in speed of about three to one. The pump, which is driven through a coupling from the forward end of the cam shaft, is of the usual gear type, the two gears being cut with four pitch teeth; but it possesses this novel feature, that the suction and delivery, instead of being located on opposite sides of the pump case, as is usual in this type of pump, are both on the same side, by which means a considerable simplification in the water connections is effected. This end is accomplished by casting the pump case with a double wall from the natural outlet between the two gears, around to the opposite side. It will be noticed on the plan view of the chassis herewith that the connections of the circulating system are extremely simple and direct. The pump takes the water from the bottom of the radiator and forces it through a short length of hose pipe, and brass connectors brazed to the copper water jackets, into the bottom of all of the jackets, and the water returns from the top of the jackets through a straight pipe, also containing a length of rubber hose, to the top of the radiator. The pump case is cast with a foot, by means of which it is bolted to a forwardly extending bracket cast on the upper half of the crank chamber.

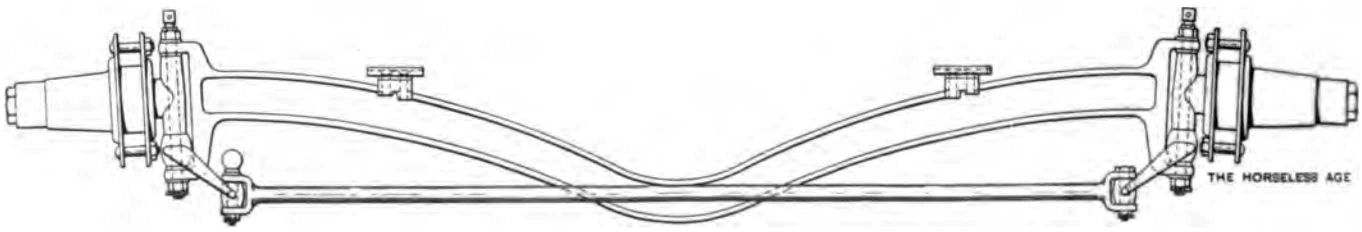
The total quantity of water carried is five gallons. A drain cock is located at the bottom of the pump, by means of which the whole cooling system may be drained of water in case of cold weather, this being the lowest point of the system. Owing to the copper jackets, however, accidental freezing of the water would not do any damage to the cylinders, although it might harm the combustion chamber.

THE MUFFLER.

The exhaust products are carried through a cast iron manifold, secured with flanged joints to the valve chamber, through an elbow and a straight exhaust pipe to the muffler, which is supported on the frame just forward of the rear axle. The construction of this muffler is peculiar, and of some interest. The device consists of two cast heads with central stand pipes on one side of about eight inches in length, and a number of concentric flanges. Over these flanges fit four concentric sheet steel shells, and the two heads are drawn together by a number of bolts extending all the way through the muffler. The sheet steel shells are of such length that when the two heads are drawn up tight the ends of the stand pipes cast on them are only a short distance apart, and, of course, opposite each other. The exhaust gases are led into the muffler at the center of one head, are cushioned, in a way, in the two opposing stand pipes, and escape from them at the open space between the two, gradually expanding as they pass from one of the annular spaces between the concentric cylinders to the next outer one, through ¼-inch perforations in the shells, finally escaping from the outermost annular chamber through an opening in the rear head.

The engine is lubricated by means of a Lunkenheimer mechanical oiler with seven feeds, four of these leading to the cylinders, two to the outer crank bearings and one to the ball joint of the drive.

The engine starting crank is supported in a bearing bracket secured to the front



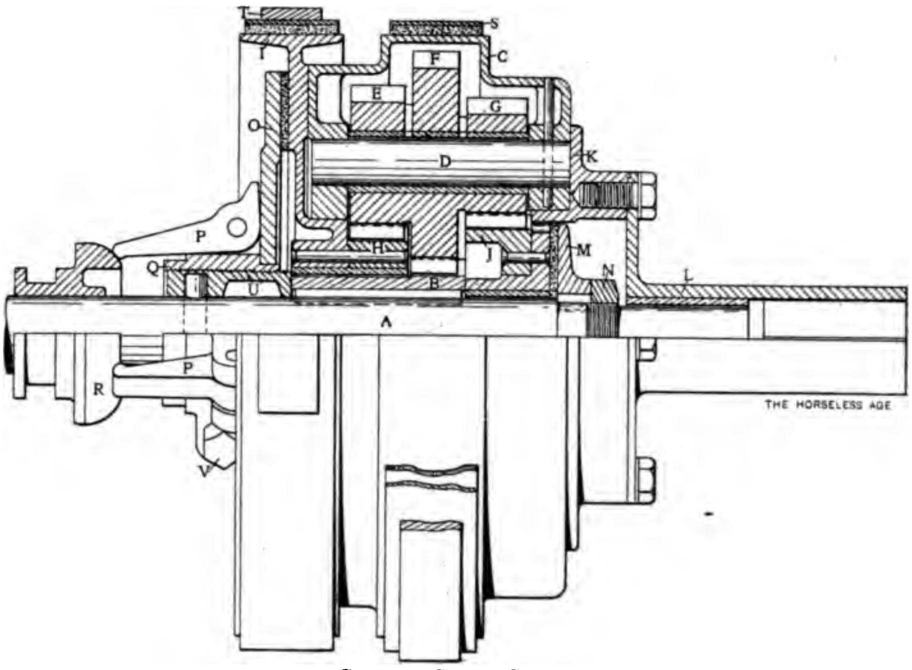
FRONT AXLE.

cross member of the frame, and remains always in position. It is automatically disengaged from the crank shaft when the engine has started by means of a coiled spring.

CHANGE SPEED GEAR.

The planetary change speed gear differs from most gears of this kind, in that it consists entirely of spur pinions, and has no internal gears. Referring to the sectional view of the gear herewith, A is a short shaft secured by a flange coupling to the flywheel of the engine. To this shaft is keyed the single driving pinion B. Free to turn upon the shaft is a cast iron drum or casing, C, in the end walls of which are supported pins, D, carrying each a set of three planetary pinions, E, F and G. The pinion E meshes with the pinion H, which is pinned to the hub of a brake drum, I, the hub of which extends through the forward head of the casing, C; pinion F meshes with driving pinion B, and pinion G meshes with the pinion J, which is pinned to a ring or disk, K, bolted to a flange on the sleeve, L, by which the power is transmitted to the rear axle. For high speed the motion is transmitted directly by locking the whole gear together. This is accomplished by means of a high speed friction clutch of the disk type, comprising the following parts: Radial disk M keyed to shaft A, and held against endwise motion between a shoulder on the shaft and a nut, N (it will be noticed that the face of disk, M, is covered with friction material); a disk, O, the inward face of which is lined with friction material, and bears against the web of the brake drum, I; the clutch dogs, PP, pivoted on a spider Q, and the sliding collar, R. It will be readily seen that when the collar, R, is forced in between the clutch dogs, P, the two disks, O and K, are strongly pressed against the end walls of the casing, C, and consequently any relative motion between either of these disks and the casing C is impossible. The gear is consequently locked, and revolves as a unit, the power being transmitted through it direct.

To obtain the low speed forward the brake band S is tightened on the casing C, and the latter thereby held from rotation. The driving pinion B then rotates the two sets of planetary pinions, E, F, G, about the now stationary pins D, and pinion G, meshing with pinion J, which is connected to the disk K and to the driving sleeve L, causes the rotation of this sleeve at a reduced speed, proportional to the size of



CHANGE SPEED GEAR.

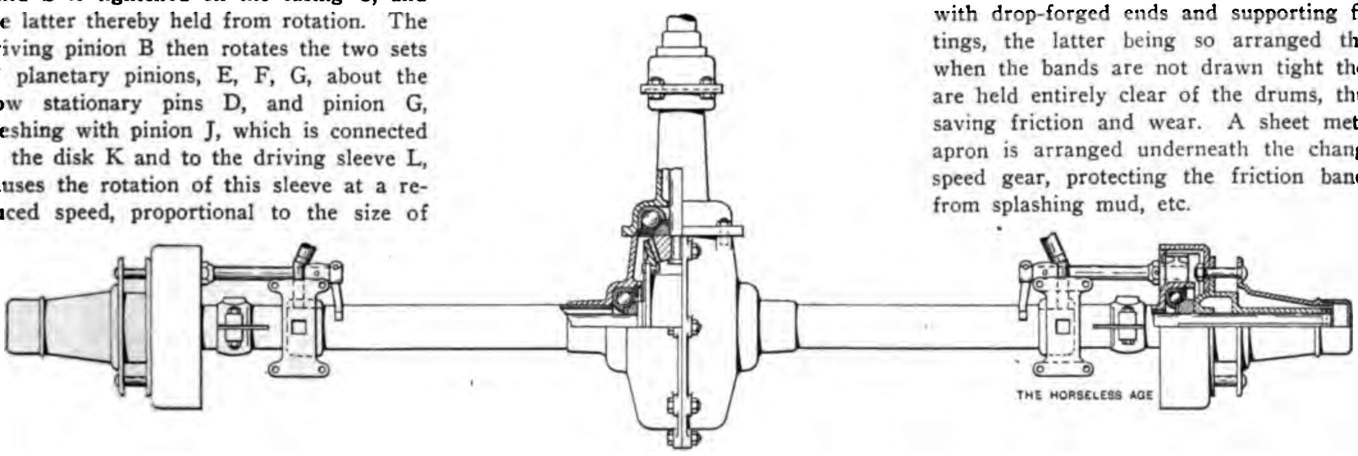
the gears now in operation. As B has 18 teeth; F, 28; G, 16, and J, 30, the ratio of reduction as compared with the high speed is equal to (28x30) ÷ (18x16) = 2.92, or practically 3.

In order to obtain the reverse speed the brake band, T, is applied to the drum, I, and the pinion H thereby held stationary. The driving pinion B then causes the planetary pinions, E, F, G, to turn on their studs, D, and at the same time roll around the stationary pinion H. The effect of this double motion of pinion G on pinion J, in mesh with it, is to cause pinion J, and consequently driving sleeve L, to rotate in a direction opposite the direction of rotation of shaft A at a speed of approximately one-fifth the speed of the driving shaft A. Pinion H has 28 teeth, and pinion E 18.

The spider Q is screwed over a sleeve, U, which is secured to the shaft, A, by means of a pin, and the high speed friction clutch may be adjusted for wear by turning the spider on the sleeve, a set screw, V, permitting of locking the spider in place when the adjustment has been made. All the pinions of the change speed gear are of steel, and those turning free on their shafts are lined with bronze bushes cut with oil grooves, as indicated. It will be observed that the outer casing, C, of the gear forms an oil-tight chamber, and the gear may be operated in a bath of oil. The rearward end of the sleeve, L, is provided with a square section socket to receive the shaft of the universal coupling.

The change speed gear is operated by means of one hand lever on the outside of the seat and by one pedal, the former giving the slow speed when drawn back and the high speed when pushed forward, while the pedal operates the reverse. The reverse can, of course, also be used for braking purposes.

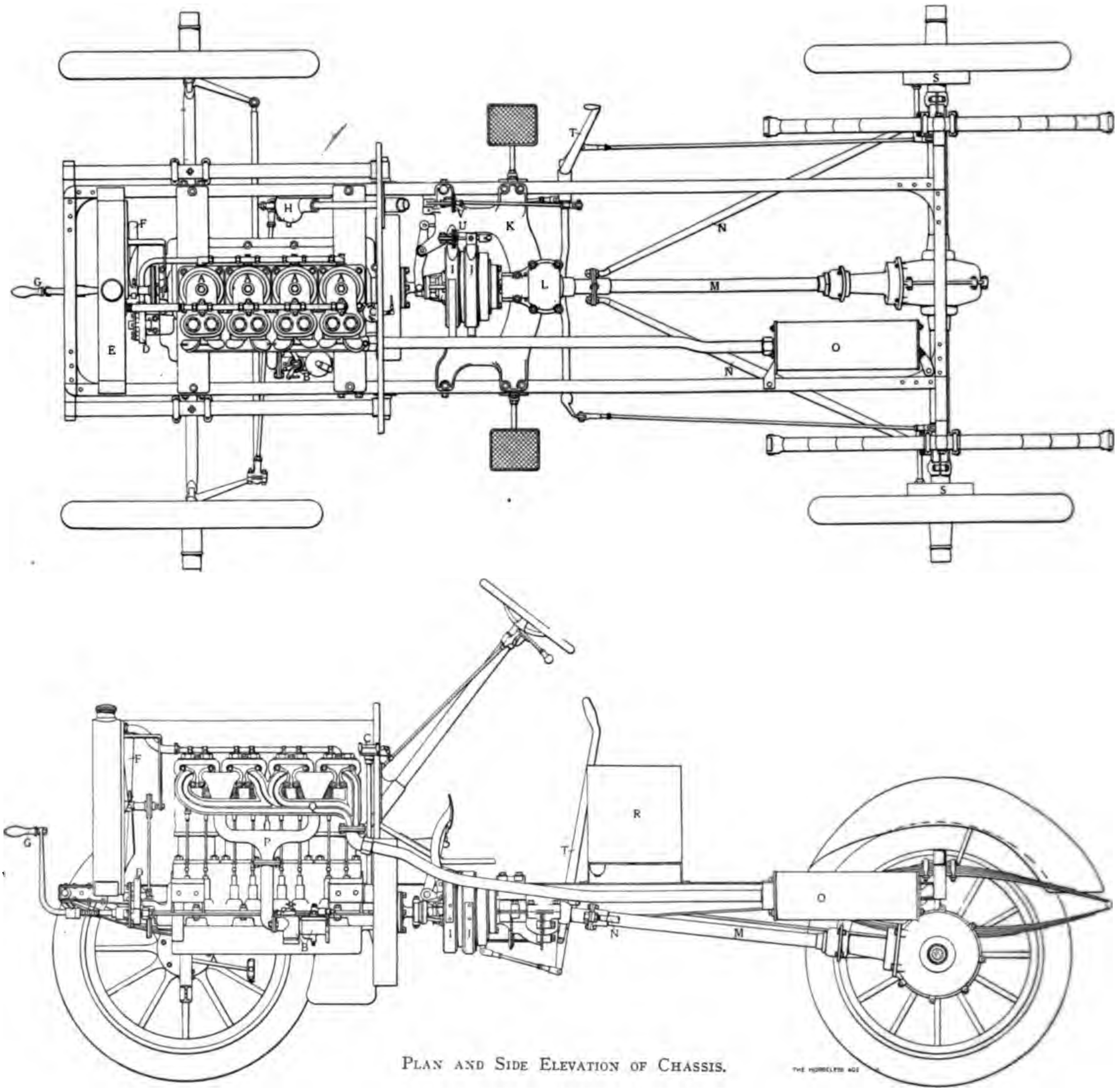
The change speed gear has no direct support on the frame. It is carried at the forward end by the shaft A, which is bolted to the engine flywheel, and at the rear end by the driving sleeve L, which has a bearing on a cast aluminum transmission frame supported on the frame side members. The transmission brake bands, or selecting bands are of 1-16 inch cold rolled steel, 1½ inches wide, and are lined with ⅛-inch red fibre. These brake bands are provided with drop-forged ends and supporting fittings, the latter being so arranged that when the bands are not drawn tight they are held entirely clear of the drums, thus saving friction and wear. A sheet metal apron is arranged underneath the change speed gear, protecting the friction bands from splashing mud, etc.



REAR AXLE.

REAR AXLE DRIVE.

The drive shaft to the rear axle has only one universal joint, at the forward end, and is surrounded by a tube, which acts as a torsion brace. The bevel gears on the rear axle are cut of steel, with four pitch teeth, and have 15 and 48 teeth, respectively. The driven gear is secured to a Warner spur gear differential, and the whole driving gear and differential is enclosed in a cast steel casing, into which the axle tubes are brazed in the usual manner. All end thrust is taken up on ball bearings, the balls back of the driving pinion being 1⅛ inches in diameter, while those on the axle are ¾ inch and ⅞ inch at the inner and outer ends, respectively. The axles are of the American Ball Bearing Company's construction, and ball bearings are consequently used throughout. The axle sleeves are seamless steel tubes 2¼ inches in diameter by ⅛ inch wall thickness. To the outer ends of the axle sleeves are fastened by clamping, the combined bearing housings, spring saddles and brake brackets for the rear wheel hub brakes. The driving shafts of the rear axle consist also of tubes, the inner and outer diameters being ½ inch and 1⅜ inches respectively; but the outer portions, to which the wheels are keyed, are solid, and are secured to the tubular parts by electric welding. Two brace rods run from lugs underneath the outer axle fittings to lugs on a fitting at the forward end of the propeller shaft sleeve. These brace rods prevent the rear axle from getting out of alignment with the frame, and at the same time share with the propeller shaft tube in transmitting the propelling effort from the rear axle to the frame, thus relieving the springs of any such efforts. The pressure is taken up on the working face of the ball joint at the front end of the propeller shaft, which, as will be seen, is of



PLAN AND SIDE ELEVATION OF CHASSIS.

AAAA, engine cylinders; B, carburetor; C, commutator; D, circulation pump; E, radiator; F, fan; G, starting crank; H, box containing steering gear; I, slow speed drum; J, reversing drum; K, aluminum transmission frame; L, spherical bearing receiving driving thrust; M, driving shaft sleeve; NN, rear axle diagonal braces; O, muffler; P, Inlet manifold; Q, exhaust manifold; R, gasoline tank; SS, rear wheel brakes; T, change gear lever. U, reversing *pedal; V, brake pedal.*

very liberal dimensions. A truss under the rear axle increases its resistance to sagging strains.

The front axle is a one-part drop-forging of I section, with forked axle ends. The axle pivots are slightly inclined, to bring the centre of rotation of the axles as close over the contact of the wheel with the ground as possible. The pivots have exceptionally long bearings, and are provided with small lubricators on top. The front wheels also run on ball bearings, the balls being 11-16 inch in diameter. All wheels are of the wood artillery type, 32 inches in diameter, with 12 spokes each, and fitted with 3½ inch clincher tires. The car has a wheel base of 92 inches and a 55½ inch tread.

The frame is of pressed steel, the side members being of the usual tapering channel section. There are only two cross members, one in front and one in the rear, these being also of pressed steel, and united with the side members by riveting to connection pieces at the four corners of the frame. These connecting pieces are malleable castings, and made of channel form to reduce their weight. Those in the rear extend outwardly sideways, and are drilled at the outer ends to receive short, heavy steel studs for pivot connection with the top spring saddles. The rear cross member of the frame has an upward bend at the center to prevent its striking the driving gear case when the springs are compressed to their limit.

SPRING SUSPENSION.

The frame is supported on semi-elliptic springs in front and on full elliptic springs in the rear, the latter being chosen to render the tonneau as comfortable-riding as possible. These springs are 42 inches long and 2 inches wide. The front springs, which are 38 inches in length, are arranged in a novel manner. They are swung outside the frame and supported on the axle four inches forward from the middle of their length. The reason of the manufacturers for adopting this arrangement is as follows: The front springs serve a double purpose, viz., to absorb the road shocks imparted to the front axle, and to transmit the necessary traction effort from the frame to the axle. These two duties interfere with each other to a certain extent, and as only the portion of the spring in front of the axle serves for traction purposes, and the rear portion is more effective as a shock absorber, an all around advantage is gained by making the forward end of the spring shorter and the rear end longer. The front end of the frame is carried on the springs through the intermediary of short, heavy steel studs riveted into the malleable frame corner pieces, and the rear ends of the springs are connected to the frame by means of shackles and drop-forged spring horns.

STEERING MECHANISM.

Steering is accomplished by means of a 14-inch hand wheel on a tubular brass column inclined at an angle of 53°, securely held in a base plate riveted to the dashboard. The latter, in turn, is secured to the frame by means of brass angle braces. The steering shaft carries at its lower end a drum with internal worm thread of two inches pitch, meshing with an internal hardened worm gear having secured to it a downwardly extending steering arm. The movable part of the irreversible steering mechanism comprises a portion of a spherical surface which moves on a similar internal spherical surface of the stationary part, thus forming a substantially dust-proof casing. The joints of the connecting rod from the steering arm to one of the steering knuckles are of the adjustable ball and socket type.

As has already been stated, the spark and throttle levers are arranged on the steering post underneath the wheel. Their shafts are inclined at a larger angle than the steering column, and are supported at their lower ends in bearings formed on the base plate of the steering column. The two levers are of unusually large size, and work on notched sectors, being locked on the sectors by their own natural spring force.

On each of the rear wheel hubs is formed a brake drum, on which acts an internal expanding brake, which is operated by a pedal provided with a ratchet lock. The brake bands, or expanding members, are supported at the middle of their length on disks fastened to the outer rear axle fittings. They are faced with hair felt, and are expanded by means of a cam on a shaft having bearings in the disk and in a bracket extending forward from the outer rear axle fittings. The brakes are enclosed practically dust-proof.

The car will be fitted with a side entrance tonneau body for carrying five persons, including the driver. The total weight of the car, complete, is estimated at 1,600 pounds, and, with the large power of the engine, the machine ought to be able to easily take all grades up to at least 8 per cent on the high gear with full load.

A New Air-Cooled Cylinder.

The Hartford Pattern & Model Company, of Hartford, Conn., are producing air-cooled gasoline engine cylinders of novel construction. The cylinders are provided with copper radiating sectors directly cast on in the mould. The cut herewith shows the cylinder just as it is taken from the sand. The cylinder heads are provided with radiating sections in the same manner, and may be either cast integral with the cylinders or separate. In the cut the cylinder is shown without head, to make the construction clearer. Each copper radiating section comprises six vanes which are fluted and turned at an angle, which is claimed to cause a deflection of the air from one to the other, thereby insuring a better cooling effect.

NEW AIR-COOLED CYLINDER.

The Halsey Steam Truck.

We show herewith a photo of a novel steam truck which has been in operation in the streets of New York for some time. The machine weighs complete, without load, five tons, and is designed to carry a load of eight tons. The rear part of the wagon is an exact counterpart of an ordinary four-horse dray, and the entire propelling mechanism is arranged in front, the front wheels being used both for driving and steering. The truck is operated by means of two steam motors with eight single-acting cylinders each, which have the general form and are arranged in the same manner as electric truck motors. Each motor is geared to one of the front wheels by spur gears at a ratio of reduction of 18 to 1. Each motor weighs 415 pounds, and at 100 pounds steam pressure and 1,000 r. p. m. develops 30 h.p. A novel form of steam control is employed, the piston of one cylinder controlling the steam admission to the next. A perfect expansion is claimed to be obtained in this manner, and the cut-off may be varied from nothing to one-half stroke. The motor has no connecting rods, eccentrics or valve rods, and it is claimed that the arrangement of the wearing parts are such that the engine becomes more steam tight as it continues in use. A 12-h.p. engine of this type is said to have been operated at 1,200 r. p. m. 13 to 15 hours per day for the last four years without repairs, and when it was taken apart the only parts that were found to need attention were the crank-pin and

main bearing bushings, which were replaced at a total cost of $17.

Steam is furnished to the motors from a water tube boiler of 100 sq. ft. heating surface, which is carried underneath the foot board in front of the driving axle. The boiler is fired with pea coal, and when starting on a trip a charge sufficient for 20 miles run is put into the boiler, the feed being automatic and no stoking required. The application of power to the wheels is entirely controlled by two levers, one operating the throttle and the other the reverse mechanism. The reverse is also used for braking purposes. The stack of the boiler extends upward through the roof of the cab, as shown in the illustration. It is claimed that by means of a superheater and separator the exhaust is rendered entirely imperceptible, and that the truck has repeatedly been taken for an electric. All moisture in the steam exhausted from the cylinders is extracted and returned to the water tank, and the uncondensed portion of the exhaust is led into the stack and discharged with the products of combustion. The water tank is carried below the truck platform; it is of sheet iron and has a capacity of 1,000 pounds, sufficient, it is claimed, for a run of 12 miles. The water is fed to the boiler by means of an independent commercial steam pump. As the motors are carried on the front axle and the boiler is supported on the spring suspended frame, a flexible steam pipe is used between the throttle and the motors.

In general appearance the truck resembles an ordinary large-sized dray. The wheels have plain steel tires, the rear ones being 60 inches in diameter and the front ones 42 inches. Front and rear axles are connected by tubular reach bars which transmit the driving effort from the front to the rear axle. The truck has a 6-foot 6-inch gauge, and an 11-foot wheel base. The steering is effected by means of a horizontal hand wheel. A particular advantage is claimed to reside in the fact that in case one of the motors should become inoperative for any reason it is a very easy matter to remove the road wheel on that side, take out the motor and replace it with a new one. The driving gears, it will be noticed, are entirely enclosed.

No trouble is said to be experienced from slipping of the driving wheels, as when the truck is operated light, 75 per cent. of the total weight is carried on the drivers; and when loaded, one-half of the total weight is still on the drivers.

This truck is manufactured by James T. Halsey, 51st street and 12th avenue, New York city.

Trade Literature Received.

The Post & Lester Co., Hartford, Conn. —Post & Lester Bulletin (on parts and supplies).

F. W. Ofeldt & Sons, foot of 25th street, Brooklyn, N. Y.—Catalogue of Ofeldt's steam-automobile specialties.

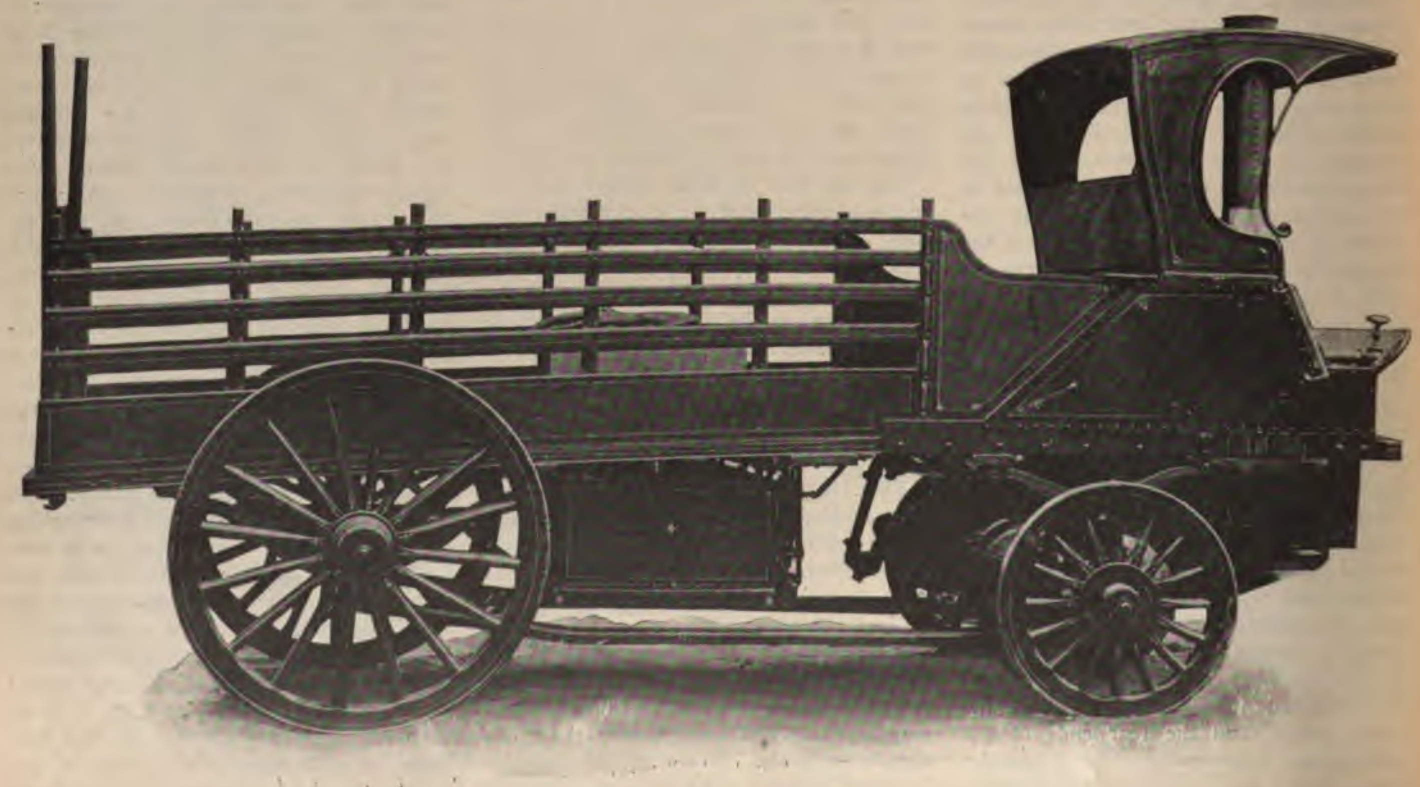
Wm. B. Riley & Co., 324-326 Market street, Philadelphia—Circular of Riley's auto robes.

Chas. E. Miller, 99 Reade street, New York—Circulars of the N. I. R. automobile shirt (made in white and black rubber) and tire repair tape.

Odd Race Report.

Following the race (at Omaha recently) a man came out seated on the boiler of a steam machine carrying 1,000 pounds of pressure. It was announced that he would attempt to break one of two records. If the machine stayed on the track he would go after the mile horizontal record. In case the boiler did not stand the test he would establish new figures for the vertical dash and return. To the great disappointment of all the undertakers in the grandstand he chose the former record and took a bit out of it.

The event of the day, the *piece de resistance* of dare deviltry, however, was the five-mile race between Webb and Oldfield. Webb drove a 60-horse power machine with a hot breath and a roar like a glass factory, while Oldfield drove his "Green Dragon." The Green Dragon has a sharp nose, a long green body, and 120-horse power bottled up inside of it. It looks wilder and it sounds like the Polish department of Hades out for noon. These two terrors raced five miles on a half-mile track at the rate of fifty miles an hour without breaking anything or killing anyone, and the person who figures out how they did this will receive a fine chromo free of charge. Oldfield won the race by three jumps, a cough and a half gallon of gasoline.—Council Bluffs Nonpareil.



Halsey Steam Truck.

LESSONS of THE ROAD

A Summer Tour in California.

By J. C. Cunningham.

(Concluded.)

After their refreshment, they folded their oily instruction books, which they said they had read through the first time, and watched me adjust the vibrator. The adjusting screw was loose and I knew in a moment that I had found the trouble. It took me some time to get it to buzzing properly and to get any ginger out of the machine, but when I handed her over to them she would take the grade all right. Strange to say, they had never looked at the vibrator. The principal reason, I suppose, was that the agent from whom they bought the car told them never to touch it, that it hardly ever needed adjusting, and then it should be done only by an expert. They were two well pleased men when I left them and offered me all kinds of pay, which I refused. They had owned the machine but a couple of months and were not very well acquainted with it. They came from near San Jose and were going into San Joaquin County.

The steepest pull, I think, we had on the mountain was before we reached Bell Station. It was short, about one hundred yards, I should judge. The twelve miles were all down hill, except this place, and I can assure you it was steep, but did not balk the old steamer in the least.

At Bell Station we met a couple of motor cyclists waiting for the cool of the evening before starting over the mountain, perhaps because their engines were air cooled.

The road from Pell Station to Hollister is fairly good, having few hills, but was terribly dusty, with the exception of the last six miles, from Four Corners into town, which is sprinkled. We met few people and did not make a single stop until we reached Hollister and took on water back of the Grangers Store, where automobilists are royally treated and water and gasoline are handy. We soon had a crowd around and among them a man with a gasoline runabout. Though we had a terrible head wind we were not long going the ten miles to San Juan, where we put up for the night at the Plaza Hotel.

We had run that day over one hundred miles and made not a single adjustment except repairing a spring, nor used the oil can nor turned an oil cup, and the old steamer seemed as full of ginger as when we started.

San Juan is a small place with a population of about five hundred, I should judge, nearly half of these being Mexicans and Italians. The old San Juan Mission, founded in 1797, is the only thing of interest in or about the place. It is said to be the best preserved one in the State, and, judging from its appearance, I think it is. Pay a priest a quarter and he will take you through it. It is well worth the time and money. How the fathers ever taught the natives to erect such a building and do such work is a mystery to any one well acquainted with the California Indians. The greatest wonder is how they ever got them to work. They are capable of doing many things, but to get them to do it is the question that has always puzzled Californians of a later day. They also have a good hotel just across the street from this mission, called the Plaza Hotel. They give a good square meal for 50c. and all other accommodations are good.

The first thing in the morning was to go and fire up my steamer and try San Juan hill before I ate my breakfast. I had heard a great deal about this hill—that it was rough and steep, very steep—but I had no trouble to climb it, though I must say that I had heard the truth concerning it. The climb commences in good shape about a quarter of a mile out of town. The first steep part is as steep as the steepest, I think. I did not go all the way up, but came back the first good chance I had to turn. From the way I took the hill myself, I knew I would have no trouble to climb it loaded.

Just after returning from the hill, I met an air-cooled gasoline car with two passengers—a lady and gentleman—going toward it. I suppose they wanted to climb it early, while it was yet cool. If this was the case, they need not have been afraid, for I saw several machines of the same make climb it during the hottest part of the day.

It was about 9 A. M. when I ate breakfast, and from that time on all through the day autos were passing through. Just how many passed I was unable to tell, but the morning paper stated that 65 left San Jose, and I suppose that number and many more like myself joined the run.

I know of no one having trouble to climb the hill, all having plenty of power. A Milwaukee steamer ran out of water while climbing the hill and had to be towed to the top, and a White steamer had a deficiency of gasoline, but the occupants were fortunate enough to get some from the drivers of two Packards who were passing them, and that took them to Salinas.

Late in the afternoon—5 P. M.—we started for Santa Cruz, 40 miles distant, where I intended to leave my wife and son and continue to Del Monte to the races alone. Before we had gone many miles, however, I had talked my wife into going to the races with me. We were going to take the first road leading to Del Monte, but long before coming to it a heavy fog came up, which was so dense and cold we were glad to put up at the first stopping place we could find. We were lucky enough to fall in with a nice family and had everything we desired.

The next morning, about 10 A. M., we started for Salinas, 16 miles farther on, and arrived there in good shape about noon after having taken nearly a dozen wrong roads. We stopped about an hour and a half there, and then resumed our journey, arriving at Del Monte about 3 P. M. Having friends in Pacific Grove, a few miles farther on, we thought best to look them up, so continued on.

The next day was Sunday, and all automobilists were allowed to go over the 17-mile drive without the customary permit. I was not aware of the fact and put the trip off until later, so never had another chance during my short stay. However, we spent Sunday riding around Monterey and the Del Monte grounds. Monterey seemed like an old home to me. I had read so much about it in Dana's "Two Years Before the Mast" that the old town seemed quite interesting to me. Some of the buildings that we saw, no doubt, were those that he spoke of as looking so cosy in their whitewash, nestling among the shrubbery on the hillside.

During the day we ran across a gasoline runabout with a crippled rear axle; also a two-cylinder touring car that the young driver had run into a tree and disabled. Pacific Grove, California, is the home of churches. Every block and vacant spot has a church, meeting hall or tent where religious services are held. No intoxicating liquors are sold here; if you want a drink, you must go to Monterey, the next town, to get it. It is not far; an electric car will take you in 15 minutes, and you can always get it there, as the place runs wide open all the time. It is just the opposite of Pacific Grove.

Monday came around at last, and with it the races. The forenoon was cold and foggy for a while, but later the sun came out and there could not have been a nicer day.

I will not go into details here describing the races, as the papers, including the Horseless Age, have already published accounts of them. After dinner, we spent the rest of the night telling how the thing was done. Next day came the hill-climbing contest.

We left Del Monte Hotel at 3 P. M., accompanied by a lady and gentleman in an air-cooled gasoline car—a brand new rig. They were on their wedding trip. Just outside the Del Monte grounds, in going up the long grade on the road toward Santa Cruz, I had to let this car pass me. I had just fired up and the old steamer was cold, but a little later I passed it on a long hill; also two other machines of the same make standing by the side of the road, one disabled in some way. I did not take time to inquire.

I did not see my air-cooling friend again until we reached Salinas (22 miles), where he caught me while looking for a place to water. He did not wait for me here, needing no water for his engine, but proceeded to Watsonville, 21 miles ahead, on the road

to Santa Cruz. They were not in sight when we had watered up and started, and we did not get sight of them again until near Castorville, eight miles distant, where we saw him ahead about half a mile.

We expected to overtake him soon, but came across a four-horse team. The tongue of the wagon was broken out and the three men connected with it were on the war-path. They ordered me to stop, and said they wanted me to make no racket either; that the machine that had just passed made more noise than a freight train, and had caused their accident. I heard later from my friend ahead that this was false; that they had the horses unhitched from the wagon when he passed, and if the tongue was broken out he had not observed it. Any way, they kept us waiting more than half an hour and during the time the oldest man gave us his opinion of automobiles. I was not aware of the real facts of the case, so could not help but sympathize with them.

They allowed us to pass at last, however, and I could not see that the horses were so bad. I think one of the horses was a colt they were just breaking, and he had caused the trouble before my friend had appeared; that the old gentleman was wrathy and wanted to vent his anger on some one, and thought that we automobile people were good objects.

Just on entering Castorville about a dozen dogs made for us, and though I dodged as many as I could, I ran over one little fellow and no doubt killed him, for he did not get up again as far as we could see. We had no trouble, however, to hear some men say that such a ——— fired thing as an automobile ought to be in ——— anyway. We expected some boys to throw stones at us, but they did not, or did not have time, as I opened the throttle wide and soon left the place far behind.

We had no trouble from here on to Watsonville, where we must have passed our air-cooling friends, as they stopped there some time and we passed on through, arriving in Santa Cruz, 65 miles, in less than three and a half hours' running time.

We spent nearly two weeks here, making short trips nearly every day to neighboring small towns and little resorts. Santa Cruz county is not the best place in the world for automobiles, being hilly out of town. During my stay there I saw but three autos beside my own.

After my stay here I started for San Francisco, estimated distance about 135 miles by the road we traveled. I was accompanied by a gentleman friend who had persuaded my wife to take the train and let him ride with me. We left Santa Cruz about 8 A. M. The morning was cool and nice, with no sign of fog—just such a day that makes people want to ride and ride fast.

Judging from the first 30 miles we expected to be in the city by 3 P. M., but such was not to be our case. We were just crossing a long bridge when we discovered we were meeting a two-horse team and the driver was asleep, being stretched out on the seat. The horses began to show signs of fright and we stopped and called out at the top of our voices. The horses kept coming on, but gradually working out of the road until they started to turn back.

My friend was running toward them all the time, but did not get to them until they turned and in doing so they broke the coupling pole of the wagon and pulled the front wheels from under the body, which caused it to fall with a jar that shook the sleeping driver off and woke him up in good shape. The horses started to run, but my friend caught them and brought them back. We thought the driver was drunk at first, but soon learned he was only asleep. He told us the cause: his family was sick and he had been up so much at night that he could not keep awake. This put us in a sympathetic mood, and we gladly helped him unload his wood and raise the body and get the wheels under it again. It took nearly an hour to get him straightened out and on the road, but he left us in a good humor and with a better opinion of automobile men in general.

We proceeded to Gilroy, a little way ahead, and had lunch. An officer looked me up and told us to not go faster than 12 miles an hour, and no one would molest us. We had been running slow near this place on account of many arrests having been made. He said he was aware of the fact, as he had been watching us.

Half past two found us in San Jose, where we replenished our gasoline and water. We had traveled in the neighborhood of 80 miles and were in need of gasoline. Several automobillsts accompanied us out of town, but one after the other took side roads and we were left alone.

About 15 miles out of San Jose, while going over a rough place, I noticed the left front wheel wobbling as if loose on the axle. I stopped to investigate and found the nut holding the fender gone, and all the nuts, even to the outside cone, and all the balls, except three, were gone. It did not take us long to find the nuts and cone. though we had to walk about half a mile back, but it took us some time to find the balls. Six or seven children came along and we offered 25 cents a ball for all they could find, and it was not long before all the balls were found but one. We wiped and cleaned the balls, nuts and cone and replaced them. I then hammered the end of the axle so that it was impossible for the nuts to come off, and we proceeded on our journey after more than an hour's stop.

I was warned by a friend who owned a carriage of the same make to drill a hole in the axle and put a split pin in it, but I did not think it necessary. Since then I have followed his advice. He said he had had an accident before doing so. I have often wondered why the company manufacturing the machine have made no provision in regard to this, as we were very fortunate in not having a bad accident.

We had no stop from this on, except for water, until we reached Oakland. We arrived in Oakland a little after 5 P. M. and had a good dinner, but it was after 8 P. M. before we were able to get a boat to take us over to San Francisco, where I found my little family waiting for me.

I remained in the city several weeks during which time I put my machine in the repair shop for any repairs the expert thought necessary. They were unable to do my work for several days, because of moving to their new garage and repair shop. The manager was kind enough to lend me a carriage whenever I wanted it.

The bill for my rig, when repaired, was eleven dollars. The superintendent of the shop, for curiosity, after hearing of my trip, put it on the testing plant and he said that in power it averaged above the company's new Stanhope.

When I left San Francisco I went by boat to Stockton, which saves nearly 100 miles and costs only $1.60 for the auto and $1.50 each, including berth, per passenger. It saved a long, lonesome ride through country I had often been over, and as the boat made its trip during the night, I much preferred to take it.

It was nearly 8 A. M. when we arrived in Stockton and about 9.20 A. M. when we left there for Modesto, 24 miles distant, where we intended to lunch. We made slow progress, however, on account of meeting a great many teams of eight and ten horses each, hauling grain into Stockton. Several times we had to stop altogether to let them pass, and in one case particularly, when passing two young ladies in a buggy driving two horses, we had difficulty.

There was a steep bank on either side of the center of the road and I either had to go back some distance or down the bank. I went back to a wide place, and then we had some trouble to get the team past, as one of the horses would not come near the auto. I thought one time of unhitching the team or blinding the unruly one, but with some persuasion we managed to get them by. The girls were very sensible, and said it was their fault and not ours. This was a little surprise to us, as in nearly all such troubles before we had been blamed entirely. People as a general rule talk very strangely when telling their horse troubles. If they have any difficulty in meeting a train or street car, the horse scares at the train or car, but when meeting an automobile the auto always frightens the horse. Strange things, these autos.

Although it is but 24 miles to Modesto, we were until half-past eleven getting there. It was my intention to follow along the S. P. R. R. from here to Merced, but Young Brothers, who own a repair shop and garage, advised me to go by the way of Water-

on account of the heavy sand along ilroad.
llowed their advice and was sorry for the distance must be 20 miles farther. is heavy sand along the railroad all but with an auto like my own I much prefer to travel that route and nter the sand, for when there is no here are good level roads and one can much better time. Of course, with a ne rig it is different, for there are .l miles of heavy sand that must be on the low gear, even with a three- transmission, and then the low gear e called into action pretty often.
iow of two cars, the horse power run- high up into the teens and built by f the oldest American companies, that :urned back or been hauled back over ›ad. The sand is a peculiar kind, a of drift sand resembling ashes that very little traction. Judging from the of the speed of my engine, I should that often it was running at a speed ould carry us 15 to 20 miles an hour on roads and we would not be moving five or six. I was never able to go :he route with my gasoline runabout, o far as I am aware I know of only asoline machines that have ever passed t without some assistance.
arrived in Waterford, 12 miles from sto, before 1 P. M., and had lunch. ·oads for that distance could hardly been better. I never learned how this came by the name of Waterford; the seems out of place or quite a con- to the surroundings, as the little town ı country barren of trees or any green ıtion near it that I could see, and as ls water we could see none except in ater troughs.
m Waterford to Rier the roads were 'airly good, but from there on to the wn of Hopetown (now deserted, only a and saloon left) the roads are not so being badly cut up by heavy freight and more or less hilly. The ruts so deep in many places I thought my procket must surely touch. Hopetown a beautiful country. In fact here is ıly pretty scenery since leaving Stock- Here we crossed the Merced river, : waters come from the snow-capped tains in sight above us.
ım Hopetown to Merced we had fairly roads, but badly cut up by heavy team- Five-thirty found us in Merced among wn people. Though not our home, it r business headquarters and nearly body knew us and crowded around. g concerning our trip. Answering ions kept us over half an hour, when esumed our journey toward home. : we arrived about an hour later. We nished a trip of more than a thousand and the old steamer had never failed :ry us wherever we wished to go.
ave spoken of the only work done on achine during the trip with the exception of having the front springs repaired in Santa Cruz and the grinding of the water regulator, which work I did one afternoon while visiting some friends in Capitola. To old experienced automobilists my troubles will seem small, and many will disbelieve them, but I can assure you that I have stated facts in every case.

From New York to Harrisburg, Pa., and Back.

By Warren H. Erb.

Having just completed a little run of 500 miles, from New York to Harrisburg, Pa., and back, it occurred to me that a brief synopsis of my trip might be of interest to Horseless Age readers, and of benefit to any one who might happen into that country on a similar mount. The car I drove is a heavy runabout of Western manufacture, probably the only automobile built west of the Mississippi River and sold in the East. I happened to come across this rig in Philadelphia last winter, and was struck by its staunch appearance, especially its 32-inch artillery wheels, its heavy single cylinder engine and its buggy top, although as far as appearance went, it was about the hardest-looking skate I had ever seen. I am told it had been run for seven years.

Well, I tried her on Broad street for several squares, but was only able to get along at a snail's pace on the slow gear, and barely able to limp back to the garage. I discovered, however, in this trial heat where the difficulty lay, and by spending $15 on her next day in the alteration of a small part, I obtained the desired result and she has since developed more power than probably ever before.

I started for New York next morning at 7 o'clock, in company with an expert chauffeur, and carrying about 35 pounds of tools, expecting to have all the troubles which an automobile is heir to, but we were both astonished that we did not find it necessary to touch a tool to the machine, except to tighten up a little packing, the engine never missing a stroke in the 98 miles. I went to work and had her painted up and put in first-class condition, and since having negotiated the run to Harrisburg, Pa., and back, it would have to be a good price to tempt me to part with her.

My run to Harrisburg was without incident until within three miles of Burlington, N. J., where I blew off a tire, and as I had the channels changed to prevent this very thing, substituting larger ones, I had an hour and a half of about the hardest work of my life springing on the shoe. After running half a mile, I caught it creeping off again, but succeeded in catching it in time to save my tube. I ran the rim to Burlington, found a harnessmaker, and had him punch and lace the shoe with rawhide, which carried me to Philadelphia, but I noticed it going down while on the Slackamaron ferryboat. By the way, this is the best ferry to enter Philadelphia from the Jersey side, as in two squares you reach Girard avenue, wide and asphalted all the way, and crossing Broad street at right angles enables one to traverse that main artery of asphalt to the extreme limits of the city north or south.

Now for a tire; I scoured Philadelphia for a 32 x 3 inch shoe, but none was to be had in that town, although the manufacturers have an agency there. Then, to expedite matters, I spent $1.25 for telegraphing to New York for one, and although the manager of their uptown office did all in his power to get me the tire, telegraphing a "rush order" to the factory at Hartford, and wiring me of his action, I have not at this writing, two weeks later, received my tire. Whether it is the fault of the tire company or of the express company remains still to be determined. After waiting for the tire three days I became exasperated, and went shopping on my own account, with the result that I found a second hand non-collapsible, just the size, at a quarter its original cost, which has proven the most reliable thing I ever rode, and I have used half a dozen different makes of tires on as many different machines. My non-collapsible required three crowbars and two men to spring it on the Dunlop channel, but it is there to stay. As I was in a rush to get away, I did not bother to cut any ways for the lugs, and I have run it with and without air. It is as good one way as the other, and quite as easy as a straight pneumatic.

I managed to get away from Philadelphia at 1:30 P. M., headed for Reading, 66 miles by the road I covered, and although Old Mariah, as she has been affectionately termed, is geared low, rather for power in hill climbing than speed, I arrived in Reading with my 14 cwt. in time for supper without incident, having taken all the hills (or mountains rather) with ease. I was up on an eminence near Collegeville, from where seven counties are visible, also the mountain at Reading, and the tower of the City Hall at Philadelphia, the difference between both extremes being about 60 miles by an air line. Next day I was rather dilatory in leaving Reading, not getting away until 1 P. M., and after rolling off the first sixteen miles, was obliged to put in at Womelsdorf for an hour and a half while a cloud-burst was spending itself. This left the road extremely heavy, and raging torrents crossing the pike in some low places, but Old Mariah plowed right through, sometimes in water and mud half way to the hubs.

When nearing Lebanon, I was flagged by a steel worker with his dinner pail, who politely but sincerely held me up for a ride. I drew up and bid him climb in, as I have a great reverence for steel workers, and especially when accompanied by a full dinner pail, as I have had six years with the Pennsylvania Steel Co., and know

what those poor devils do and suffer for their 12 cents an hour, which is about the average pay. This man was on night turn, and as he had four miles to walk between his home and work, 20 cents a day for car fare made quite a hole in his pay, consequently he was on a lookout for a free ride, and as he was profuse in his thanks, I felt that I was none the worse for having carried him through the mud.

And now as to toll gates and the pike companies who operate them. They have the audacity to charge five cents per mile on some parts of the road, and do not keep up the road at that. Some parts are almost impassable, and no part is really very good. Take the section from Palmyra to Hummelstown on the Reading pike, for instance. A trolley line is under construction here, dirt and stones are dumped into the middle of the road by the cart load, and not even leveled off in some places. I had practical experience in one of those places where I ran in up to the hubs, and for fear of tearing out my transmission or breaking the chain, I obtained a pull from a rig that was passing. I first placed a new rope double across both axles, car and wagon; it snapped at the first pull; then, after four-ply snapping also, as a last resort I attached a trace, when she drew out. Night then having overtaken me, being delayed by a storm, and as I was informed that there were still worse places ahead, I decided to accompany the men who so kindly tendered me the pull, to their farm, and being covered with mud, and not having had any supper, I was glad to retire at 9 P. M.

Next morning I was up at five, and was presented to the Governor, who invited me in to breakfast. I can best describe his personality by saying that he was a very kind, intelligent and Christian gentleman, and is an ardent member of a section of the Dunkard Church, known in those parts as the "river brethren." After reading a chapter from the Bible, all present were in due reverence while the morning prayer was said, and as seats were taken at the table, blessing was asked by the mistress. After breakfast a prayer of thanks was offered by the master. When I inquired what my bill was, I was told "nothing," but before departing I did insist on the mistress accepting something, rather as a gift. I say all hail to the noble farmers. After filling my water tank, I gave Mariah a turn, and we were off and arrived at our destination by 9 o'clock.

Next day, with the assistance of one man, two boys and a hose, I succeeded in removing the mud from the rig, polished up the bright parts, examined the bearings, and was ready for the return trip after half a day of hard work. The return route was via Campbellstown and Colebrook, and near the latter place in the Conewango Valley the old homestead farm was visited. The road between Campbellstown and Colebrook was probably never before traversed by an automobile. The reason for this will be best comprehended by he who attempts to travel this route. The distance is only four miles, and I will warrant that no speed limits will be broken, unless the brakes fail on some of the hills. My time was about three miles an hour on the slow gear. Old Flora is the hardest hill I know in Lebanon County, and I know nearly every road was encountered on these four miles, but by snaking it over the steepest "thank-you-mum," I got up, and my climbing propensities having by this time been intensified, I spent a half hour climbing into a very attractive cherry tree, where the choicest and richest cherries hung in bunches.

Next morning at six, Mariah was headed for Philadelphia. The first seven miles were run on slow gear entirely, it not being safe to use the higher gear at any time, on account of the frightful condition of the road. The Philadelphia pike was finally reached at Elizabethtown, after about two and a half hours of hard work. This section of pike is fairly good, at toll rates of five cents per mile. In ascending a sharp hill near Mount Joy, I broke the chain, a link of which was cracked the previous day in climbing Old Flora, but being near a smithshop, a new link was put in while we had a most delightful dinner at the Red Lion Hotel.

The pike continued good on through Lancaster and down to near the Gap where two miles of slow gear work up the side of the mountain about exhausted my batteries, which, being of a new and unknown brand, lay down rather sooner than I had anticipated. The emergency battery, which was also pretty well run down, was switched on and another mile toward the oasis at Coatesville was rolled off, when all the cells lay down together. Coatesville, where I had intended replenishing supplies, was still four miles distant. I concluded walking to the intervening town, a mile and a half distant, was the most expeditious thing to do, and thence I perambulated in true hobo fashion, with my coat on my arm, in quest of batteries or telephone. Had no luck on former, but made connection on latter, and was informed that a gentleman at Parkesburg, two and one-half miles distant, had six autos. Telephone colloquy: "Is this Mr. Beale, Parkesburg?" "Yes." "Have you an automobile?" "Several." "Well, I'm stuck over here on the pike, batteries run out; can you spare me some? Will pay double price and come over after them, if you will help me out." "Mr. Beale is not here just now, but if you will wait, will call you up in about fifteen minutes."

After the expiration of the fifteen minutes, I began to get nervous and rang up again, when I was informed that they were on their way over to the pike with the batteries; so I straightway retraced my steps in the direction whence I had come, and upon arriving at the Parkesburg road, I discovered fresh auto tracks which led down in the direction where I had backed in under an apple tree, but before arriving there I was met by Mr. Beale in a 40 horse machine, coming back to pick me up, having brought his chauffeur and six dry cells, which were already in place. One turn of the crank and we were off to Parkesburg at Mr. B.'s invitation, where gasoline and engine oil were taken on at his private garage. The road from Parkesburg to Coatesville was a decided improvement over the pike.

For a complete and well appointed garage that of Mr. Beale's probably ranks with anything in the country, and as the personification of the highest type of American gentleman, Mr. Beale certainly has no peer. To prove the estimation in which he is held in the community, one has only to inquire, and at the mention of his name you may be told, among other things, that when the Steel Trust was endeavoring to purchase his plant several years ago, they were informed that only on condition of their agreeing to employ all his old hands, would he sell, as he would not see the men who had served him faithfully turned out of the works.

Nothing more of interest transpired in the run of 40 odd miles to Philadelphia. I arrived there in fine shape, and started for New York next morning, finishing the last fifteen miles in a driving rainstorm.

As an illustration of the difference between the gentlemanly and fraternal treatment I received at the hands of Mr. Beale, I will cite an incident upon arriving in New York, while coming up Broadway from the Staten Island ferry about nine P. M. I knew my gasoline was very low, and while measuring same, several autos passed me, so I concluded to see what the disposition of a New York autoist would be in case of emergency to help one out; therefore I hailed one who was passing slowly and asked him if he could spare about a quart of gasoline to get in on, but he never even deigned to reply—did not notice me at all, although I was close to his car.

Leather Coat for Automobiling.

An excellent leather coat for automobiling is made of very soft leather, which has more the appearance of kid, in either deep plum color, green, brown, or other shades; it is lined with a thin woolen material. The coat has semi-fitting fronts and a tight fitting back, the short shoulder cape carried down over the front in the form of a plastron with strapped seams; the sleeves are full, and the collar turns up around the neck. The same coat is also made in tweed, piped with leather.

An automobile stage line is now in operation between England and Badger, Minn.

OUR FOREIGN EXCHANGES

The Abatement of the Dust Nuisance.

By Leo Van Westrum.

[Following is a condensed translation of a paper read by the inventor of the sprinkling fluid "Westrumite" before the recent Fifth German Automobile Congress. Westrumite was first used with success on the Gordon Bennett course in Ireland in 1903, again on the Taunus course this year, and has been applied experimentally in many important cities of the Continent. It consists of crude oil rendered soluble in water by means of a saponification process, consisting of the addition of ammonia. The cost of a ton of the fluid is about $60, this giving 10 tons sprinkling fluid for a first application and 20 to 30 tons for further applications, the density of the solution first applied being 10 per cent. and for later applications 5 per cent. and less.—Ed.]

So much has been said and written on the dust problem that I shall confine myself to briefly discussing the harmful effects of road dust in a general manner. I believe that if it were possible to make streets entirely dustless the precious lives of millions of unfortunate consumptives might be saved. The material damage caused by dust to furniture, machinery, provisions, etc., is impossible to estimate.

Furthermore, real estate located on streets with much traffic depreciates in value in the course of time on account of the dust nuisance, especially real estate in fashionable residence districts, the inhabitants of which appreciate nothing so much as fresh air. The dust produced by the increasing traffic deprives many otherwise fine resorts of the advantage of a pure atmosphere. On the Riviera, for instance, it may be observed that trees and plants far into the gardens are entirely covered with a grey coat of dust. The pleasure drives, which were formerly so popular, have been entirely discontinued, because it is no pleasure to the ladies to drive in a dense cloud of dust. As the dust is largely a portion of the street material and the latter is reduced by its removal, it follows that any process for binding the dust will tend to preserve the road surface. When this fact is once thoroughly understood by the authorities, we may hope to see the dust disappear from the streets within a definite time. Too much cannot be said against the practice of sprinkling streets with water, quite common everywhere, because water spraying loosens and destroys particularly macadamized streets, and produces a soft mud which may prove very dangerous to automobiles and horse riders, and the removal of which is quite expensive.

The widespread impression that dust is produced only through the wear of the surface layer of the street is entirely wrong. By far the greater portion is due to the fact that the pressure of traffic forces the heavy stones down into the road and allows the lighter material, sand pulverized to dust, to rise, from which result the holes in the street surface which are such an eternal source of expensive repairs. The abatement of the dust nuisance may practically be divided into two parts, viz.: (1) the suppression of dust on the surface; (2) binding the paving material either during construction or during repairs.

The first operation consists in sprinkling the streets with suitable sprinkling fluids. We need, however, not delude ourselves that the nuisance will be obviated by this means to any extent, because only the cities which dispose of large appropriations for street watering purposes are able to take up this problem, they spending a great deal of money anyway in keeping the streets sprinkled, and by using suitable dust-binding fluids they might save sufficiently on wages that the introduction of the improved method would only occasion a very slight increase in the annual expense account. And yet, I am sorry to state, large cities which, after extended tests with a certain process expressed themselves entirely satisfied with the results, declared that this year they did not dispose of the necessary funds to introduce the process. The cause of this condition of affairs is that, as a rule, contracts for sprinkling are made with different teamster establishments, and these contracts must be carried out. The funds available for sprinkling purposes are usually fairly well exhausted by these contracts, and it is therefore hardly possible to introduce any new processes while these contracts are in force.

I now arrive at the second question, which will be of much more interest to automobolists: How can country roads be rendered free from dust? Theoretically this end may be accomplished by the same means by which city streets are kept dustless, but practically these means are inapplicable, because the provincial authorities concerned can hardly be expected to make the necessary appropriations. The only way of accomplishing any beneficial results is to improve the methods of road construction. With the present methods of building highways, which consists in compressing stone and sand with water by means of steam rollers, there can be no possibility of binding these materials together. Traffic will in time pulverize the sand and force it to the surface, with the result that the road is not only very dusty, but also in need of repairs. In America attempts have repeatedly been made to saturate the whole road with crude oil, but not much success has been attained, for the reason that it is very difficult to effect an intimate combination of the stones and the sand with oil. To overcome this difficulty, attempts have been made in England to heat oil and tar to a high temperature, and also the stones used in the construction of the road. Very good results have been obtained in this manner, but it is doubtful whether the process is of practical application, because of the great cost and complication. Most of the experiments that have been made in this direction have always been on a small scale, the trial stretch being at the most 1,200 to 1,500 feet in length, and the engineers who conducted these experiments became convinced that the application of the processes on a large scale would be attended with many difficulties. Even leaving aside the question of cost, a process of this kind requires a very complicated apparatus of heating tanks, etc., skilful employees, and an extended period of dry weather. As in practice it is impossible to foretell an extended rainless period, even in summer, little is to be expected from this method. This applies particularly in the case of a recently much-talked-of process for producing a compact elastic mass from a combination of tar and oil. If rain sets in during the time the work is in progress a thin mud is formed which requires weeks to dry, and during this period the road is practically impassable for traffic. This could be noticed at Dresden in the Lennestrasse at the time of the Building Construction Exhibition. On that occasion such a mud was produced that the city government found it necessary to have whole loads of sand dumped on the street to absorb the oily mud, and this sand had, of course, to be removed again. In addition, the streets because muddy every time it rained.

It will hardly be possible to use other materials than oil and tar for binding dust, for the simple reason that there are no other materials of equivalent effectiveness which are to be had as cheaply as crude oil and tar. All the experiments have shown that oil and tar have a very powerful binding effect, if it is only possible to completely saturate the sand and stones with them. The methods just described are, as stated, too bothersome, expensive and dependent on weather conditions, and require that streets treated must be closed to traffic for long periods. There is, however, a very simple method of securing the full benefit of the properties of tarry and oily substances, and avoiding their disadvantages, and this method consists in making these substances soluble in water, in which case they will be eagerly absorbed and strongly bind the street paving material into an elastically compact mass. The solutions may be spread on the roads by an ordinary sprinkling wagon, and if the work is done at night, the streets need not be closed to traffic. Care must, of course, be used that the oil or the tarry emulsion becomes insoluble after the evaporation of the water, because otherwise it would be dissolved and washed away by the next rain. The insolubility must, however, not be so complete that the substance is entirely incapable of

absorbing water, but it must always retain the property of taking up enough rain water to bind any new-formed dust. This is the only means of preventing the production of mud, as the rain not absorbed will quickly run off, and the rest form an emulsion and bind the dust.

Practice has proven that roads thus treated dry much quicker after a rain than ordinary roads, and that there is no formation of mud, as in case of water-sprinkling or after a heavy rain. Now, if in the construction of a new road, either macadam or stone pavement, all of the sand employed is saturated with this emulsion, it is bound together so effectively that it is impossible for the pressure of traffic to force it to the surface, and this already results in a considerable reduction of dust, as the production of dust by the wear of the upper surface, especially from automobile traffic, is very small. The development of dust through automobiles does not result from the wear of the stones contacted—the tires being entirely too soft to produce any wear on stones—but results from the vacuum formed back of the contact of the wheel with the road surface, which sucks the sand from between the stones, no matter whether it is a macadam or stone-paved road. If, with the increasing automobile traffic, especially on the country roads, no efforts are made to provide an efficient binding material, it may be predicted with assurance that in future the life of the roads will be greatly reduced, because the extraction of the filling material, sand, from between the stones will naturally ruin a road much quicker than the surface wear from horse hoofs and iron tires.

There is at present certainly no longer the least doubt regarding the rapid introduction of automobiles on a large scale, consequently the authorities entrusted with the care of the roads must get used to the idea that they have to count with automobiles as a factor entitled to the use of the roads. The roads exist for traffic purposes, and in case the means of traffic are changed, the roads must be made to conform to the new requirements.

Many rural and urban authorities have already begun to replace the otherwise very satisfactory macadam pavement with stone pavement, because it is more resistant to heavy traffic. But from the standpoint of the public, this move is very much to be deplored, because the stone pavement has not only the disadvantage that it disables horses in short order, but also causes much annoyance to every one using the street or living near it, owing to the great noise produced. Besides, it is not exactly a pleasure to drive over such a pavement, whether with an automobile, bicycle or horse wagon, in case it is not absolutely uniform. This much to be desired uniformity will, however, hardly ever be secured on a country road. Automobilists are, therefore, much interested in the retention of macadamized roads; only they should be made dust-free and durable, because the dust and the many chuck holes are the great disadvantages of a pavement which otherwise combines all desirable qualities, being almost noiseless, and much more uniform than stone pavement.

I hold that it is absolutely impossible to make a road absolutely dustless all at once for a period of years. I presume I may be allowed an opinion on this matter, as thousands of kilometers of roads have already been treated according to my method, and I have intently and persistently observed many roads. In case a road is saturated with oil from the beginning, the fine dust produced by wear will be absorbed by this oil. The case is somewhat different, however, with dust of earthy substances not in the pulverized condition, which are blown on to the road, ashes lost from wagons, etc. Even if the streets were covered with steel plates, as is now being tried in southern France, it would be impossible to make them entirely dustless. If the road surface is made too oily-elastic, as Prof. Buttner is advising, so that the oil or tarry substance will bind the dust blown on to the road into coarse grains, it will also stick to the shoes of pedestrians, rubber tires, etc., and a lively agitation in opposition to roads thus treated might be expected.

It must not be forgotten that the authorities have to count with the public who are only too much inclined to raise objections against such innovations. I have considerable experience in this line myself. While there have been no objections raised in America against the odor of crude oil, which is certainly very strong, and no complaints in over 100 cities where my method has been applied—the odor being naturally considerably reduced by the dilution of the oil—in Wiesbaden a number of persons pronounced the odor infernal, and stated that they would rather swallow the dust than have dustless roads and stand the smell. Lately, however, it has been possible to almost entirely obviate the odor.

The process of treating the road surface with tar, which has been applied with considerable success in many localities in France, is also dependent on weather conditions, and consequently the treatment of long sections is a very bothersome undertaking, particularly also on account of the complicated nature of the process, and the fact that the streets must be closed to traffic for a long time.

The trials made in several English cities, of sprinkling streets with sea water, have not furnished any favorable results; besides, a liberal sprinkling with sea water might cause optical diseases.

As it has frequently been claimed that Westrumite has an injurious effect on the varnish of carriages, I would like to present an opinion from the noted chemist Dr. C. Bischoff, of Berlin. In connection with this opinion, I would remark that it is, of course, to be recommended to drive slowly over a road only recently treated. This is a matter of little moment, as the drying requires only a few hours, so that there can be no question of traffic delay. Fears have also been expressed that Westrumite might be harmful to rubber tires. I have before me

Ventoux Hill Climbing Contest: Finish at the Summit.

RICHARD-BRASIER CAR ARRIVING AT THE FINISH.

etter from Herr Willy Tischbein, of the ntinental Caoutchouc and Gutta Percha ., which is to the effect that these fears unfounded. The Cyclist Touring Club Holland has made extended experiments its own expense in different cities, and it a report to the Mayor of Nymwegue ich was entirely favorable for the use of emulsion.

According to these several statements, it shown that (1) Westrumite binds the st, and does not occasion too great ex-nse as compared with water sprinkling;) no mud is formed during rain; (3) it es not injure the varnish of vehicles; (4) has no injurious effect on rubber tires, t, on the contrary, preserves them; (5) has an appreciable saving and preserving ect on roads; (6) it kills weeds, but has bad influence on trees, bushes or other nts.

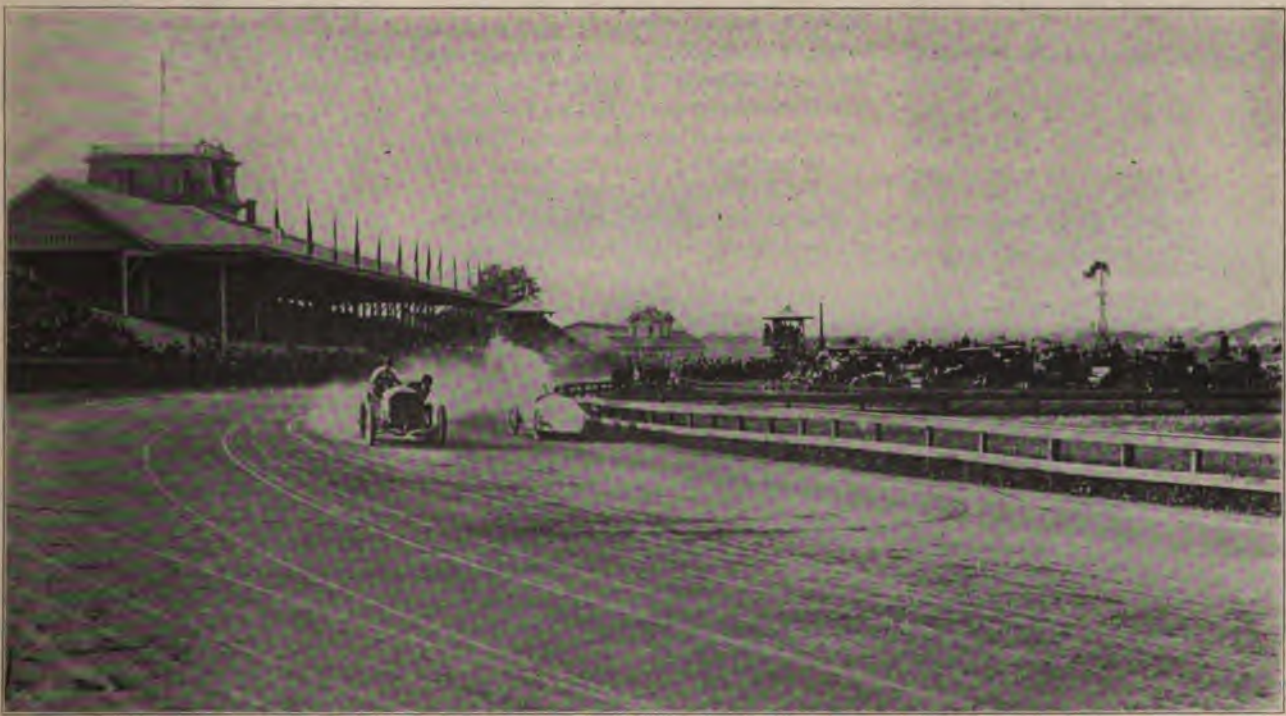
Ventoux Hill-Climbing Contest.

The third annual hill-climbing contest to the observatory on top of the Ventoux hill, in southern France, took place on August 28 and 29. The course is 21.6 kilometres (13 miles) in length, and the grade exceeds 9 per cent. almost the entire distance, and is over 13 per cent. near the top. Last year the contest, or part of it at least, was run in a heavy fog, and resulted in some serious accidents.

On Saturday, August 28, the cars were weighed in, at 9 o'clock A. M., at the railroad yards in Avignon. After the weighing in, lots were drawn by the entrants in the racing section, for starting order, and in the afternoon took place the climbing contest for touring vehicles.

Starting from Avignon, the tourists drove to Bedoin, which town was found to be in holiday mood, and from there continued to the top of Mont Ventoux. Many non-entrants also made the run up the hill, mostly early in the afternoon, to view the climb from the summit, and the hotel at the summit and the observatory were crowded. The classification for touring vehicles was according to price.

The contest for racing machines began at half-past 9 o'clock. The former records were beaten by many contestants, among others by Rougier on a Turcat-Méry, Lancia on a Fiat, Duray on a Darracq, Hemery on a Darracq, and Le Blon on a Hotchkiss. Rougier made the best time, viz., 21m. 12 2-5s., and won the contest. Some minor accidents occurred. Young Clement, who is entered to drive in the Vanderbilt Cup race next month, missed a turn, drove into a ditch and broke off a rear wheel. Maurice Fournier bent a lever and Vitalis broke his pump.



PROVIDENCE RACE MEET MATCH BETWEEN MERCEDES AND STANLEY (PAGE 267).

COMMUNICATIONS

Auto Notes from Wyoming.

Editor HORSELESS AGE:

As I am taking an enforced vacation and am about to return home, I will give in detail some of my experiences in regard to automobiles and the troubles which beset them and their owners and drivers. On arriving in Cheyenne, about a month ago, I applied at once for a situation in an automobile and bicycle repair shop. There are six autos owned here and in the immediate vicinity, besides numerous motorcycles.

Of course, the tires gave the most trouble, and the double tube clinchers are of no use at all in this section of the country on account of the cacti which abound here. In the case of the heavy single tube tires, the thorns on entering remain there, and no trouble results, but the outer shoe of a clincher being punctured the thorn penetrates the inner tube and as a consequence the air escapes through the hole into the casing and thence into the outer air. Leather shoes are of no avail, but the cellular tire seems to have a great future before it in this trackless, cactus-ridden country.

In driving one of the machines I noticed that the engine was not giving much power, so I endeavored to locate the trouble, looking over the inlet and exhaust valves and adjusting the carburetor. It was of no use, however; the engine seemed deficient in power and on comparing notes with the other mechanic here I discovered that he was of the opinion that the rarity of the air was the cause of the lack of power. However this may be, I am forced to accept this explanation for want of a better one. I should like to read your opinion in regard to this and should like to hear from other mechanics who have had the same trouble. We have had quite a bit of rain the past two or three weeks, and I have found that an engine which would work well in dry weather would not do so when the air was laden with moisture, and vice versa. On tinkering with the carburetor the trouble seemed to be remedied. I may be barking up the wrong tree, but I am willing to accept any other explanation which is more tenable.

The water used in the cooling systems has a knack of boiling away unaccountably and leaves a white deposit in tanks and radiators, which I am told is due to the presence of alkali. The winters are severe here, I am told, and the solution of calcium chloride which is used in the East is absolutely worthless here. They use a light oil known as "ice machine oil," made by the Standard Oil Company, which gives ance which requires looking into to be prop- *universal satisfaction.* The only objection is that it causes a disagreeable smell to emanate from the engine and tank. This oil is extremely low in price—about 15 cents per gallon. I am going to give it a test in a friend's car this winter in the East and try it out thoroughly.

Since coming here I have induced several owners to discard jump-spark coils and plugs and take up the primary automatic igniter instead. In every case they have given no cause for complaint. One of the cars broke several teeth in the bevel gears driving the differential and strained the universal joints. None of the repair shops has a lathe, and all work of that kind must be sent to Denver or back East. The Union Pacific shops are located here, but I suppose they don't care to bother with small jobs of this kind. Cheyenne is just emerging from the effects of "frontier days." The usual feats of horsemanship and cow-punching were shown and automobile races were also scheduled but were not pulled off on account of lack of entries. I was disappointed in this, as I wanted to compare the time with that of some trials I have seen in Cincinnati and vicinity. But the public here is most interested in horse flesh, and the automobile suffers in consequence. An Orient buckboard made the run out here from Denver last week and the owner stated that they experienced no trouble whatever during the run. Gasoline sells at 30 cents per gallon here, and is consequently used sparingly for cleaning chains and parts. All grease and dirt is scraped off laboriously with the aid of soap and hot water.

JULES OUVRIER.

Fast Hill Climbing.

London, September 2.

Editor HORSELESS AGE:

Dear Sir.—Referring to the extraordinary time accomplished by Rougier on the 45 h. p. Turcat-Méry car in the big French hill climb on Sunday last up Mount Ventoux, I have been making some calculations which may be of interest.

Most of the leading makers were competing, and the car driven by Rougier was the same car which he drove in the Gordon-Bennett race in Germany. The Mount Ventoux race is a hill-climbing competition, the course being 22 kilometres in length and rising 1,600 metres. When the time taken in climbing Mount Ventoux, viz., 21m. 12s., is looked into, it will be found that the car rose at an average speed of well over 5 ft. per second, faster than the fastest lift in the world.

Remembering also that the road up the mountain has some very sharp bends which mean practically stopping the car in order to get round, and the four first kilometres are on the flat, it is fairly correct to say that Rougier's vertical speed was over 6 ft. a second—really an extraordinary performperly appreciated.

Rougier broke his own record by 3m. 38s. and the official record by 6m. 5s.

CH. JARROTT.

Tire Queries.

Editor HORSELESS AGE:

It has been very interesting to me to read the different articles on the care of automobiles, and right here I want to congratulate you on having the best paper published in its line. Automobile owners of moderate means, living away from all repair shops, etc., may find in your columns lots of information of much practical value to them, and I hope the good work will continue.

The subject of tires has been quite fully discussed, but I would like to know what is the proper thing to do with them as soon as they go into winter quarters, when there is no place except a barn where it is very cold. My idea has been, if there was nothing given through your columns, to take off the tires, clean and dry them, inflate the inner tube just enough to hold its shape, place same inside of outer shoes or cover, wind with canvas or cloth and place in a cellar, where it is not too dry, but dark, for the winter. This may not be the thing to do at all, but through your paper we hope to learn about it.

In the last issue of the HORSELESS AGE you speak of the care to be given to tires when cut or scratched so the dirt gets in, recommending cleaning them thoroughly to prevent further damaging, etc. Is there not some kind of preparation that may be painted or rubbed on the tire, in the nature of a paste, glue or cement, that will adhere to the rubber sufficiently to prevent this, and also to preserve the rubber? We would not expect any of the tire manufacturers to answer this, but there must be those outside the tire trade who are thoroughly posted in the matter. The tires being the most expensive part of the car to keep in repair, it should be the first to be thoroughly discussed.

C. A. CLINE.

[The tires may be either left on the wheels during the winter or taken off. In case they are left on the wheels, they should be removed before the car is stored and thoroughly cleaned, the same as the rims (of both dirt and rust), then put together again, inflated, and the axles blocked up so the tires will be off the ground. Every care should be exercised to keep them dry. The better plan, however, is to take the tires entirely off the wheels, yet jacking up axles so the rim will not be in contact with the ground. The inner tubes should be cleaned of French chalk (if any has been applied to them), slightly inflated and hung up in a place where they are protected from light

air drafts. The outer covers, after g been thoroughly cleaned, may be d against the wall, standing on s so as not to be in contact with the d, in a dark and fresh, but not moist. We do not know of any such rations for treating cuts in outer as you inquire about, but believe the available method of repairing a cut is to revulcanize it. We shall be however, to give space to any sugn from readers that may avoid the sity of revulcanizing.—Ed.]

. A. A. M. Consider Show Matters.

e executive committee of the National iation of Automobile Manufacturers on September 7 at their headquarters ew York. Fourteen members were nt. A report was received from a nittee from the Motor and Accessory facturers, and it was decided to give feet of space in Madison Square en for the exhibition of parts and acries.

sanction was granted to the Boston mobile Dealers' Association for a show held in March, 1905. The show come was given power to act on all other cations for local shows.

e following resolution was adopted:

o person, firm, company or association be permitted to exhibit, directly or ectly, in his or their own name or in ame of an agent, dealer, jobber, branch , or any other person, firm, company sociation, who or which has or have ited or contracted to exhibit, or perd goods made or imported by him or which he or they own or control to hibited at any automobile show held e United States after the first day of mber, 1904, which has not been ofy sanctioned by the National Associaof Automobile Manufacturers, Inc. applicant hereby expressly agrees, in deration of the examination of, atn to and deliberations upon his apion, that in case such goods shall have subsequent to September 1, 1904, or hereafter be exhibited, or in case any ment shall have been, subsequent to date, or shall hereafter be made, to it them, or in case anything shall have done by the applicant contrary to the or spirit of the foregoing rule, any allotted to him, them or it, at the - annual show in (insert name of and any sum which may have been for rental thereof, shall be forfeited to here insert name of promoting organi-), and shall be at the disposition of id (here insert the name of the prog organization) unreservedly, no matwhat time after the date of this apon such transgression of this rule have occurred."

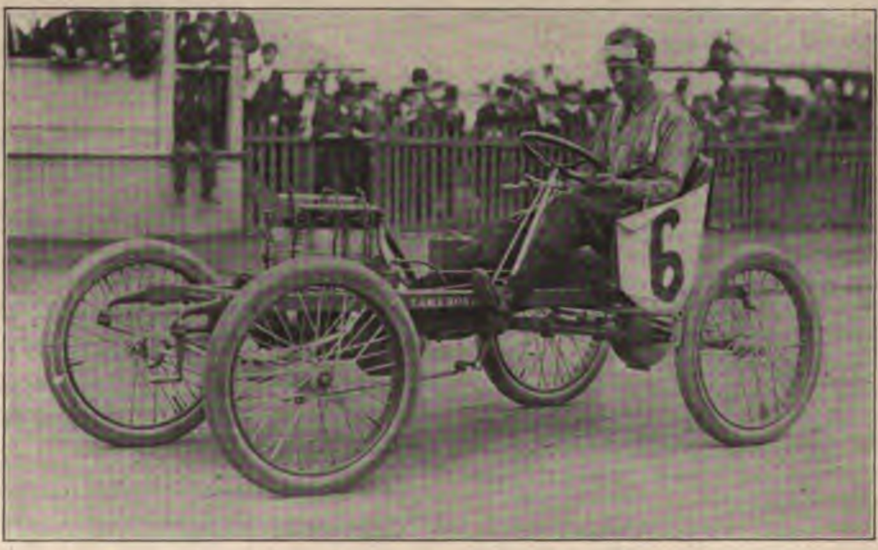
The Ford Racer.

Rhode Island Race Meet.

The third annual race meet of the Rhode Island Automobile Club was held at Narragansett Park, Providence, R. I., on September 10. Record breaking proved to be the feature, five of the established figures "going by the wall." The "Flying Dutchman," which is the name given to the 90-horse power Mercedes car which won the International Cup race in Ireland, with Jenatzy driving, and is now owned by H. L. Bowden, succeeded in making new figures for five and ten miles. The Stanley steamer, driven by L. S. Ross, lowered the records for that class of vehicles for the distances of one, five and ten miles.

It was in the first heat of the five-mile race for cars weighing between 1,432 and 2,204 pounds that the fast work began. The big Mercedes and the Pope-Toledo of A. C. Webb were matched. The former won the heat easily in 4:50 4-5, which was the best time that had ever been made on Narragansett track. In the final heat of this event, the time for the five miles was placed at 4:41 2-5, which is 2 3-5 seconds better than the former record.

The Stanley steamer, which is of the "freak" variety in that it resembles in general appearance a submarine boat more than the average automobile, tried conclusions in the ten-mile free-for-all with the "Flying Dutchman." The steamer jumped into the lead soon after the start of the final heat and managed to hold it against its larger rival until the quarter pole in the second mile had been passed. In the eighth mile tire trouble developed in a driving wheel, and Ross was obliged to drive the remainder of the distance on the rim. The Mercedes won the heat in 9:23 4-5. The former world's track record for the distance was 9:32½. In the final heat of this event both the five-mile and ten-mile records were again reduced by the same car, and new marks were established for one and ten miles for the steam class by Ross in his Stanley. The world's five-mile record was placed at 4:37 2-5, and the ten-mile at 9:13. The last of the ten miles was covered by the Stanley in 57 4-5 seconds, which is 3 1-5 seconds better than the previous mark which was made at the meet last year by Cannon. Ross' time for the entire dis-



New Three-Cylinder Cameron Racer.

View of the Grounds Back of Grand Stand.

tance was 10:26 1-5, and is a new record for this class of car.

The five-mile record for steam cars was made in the special race for this type of car, which was contested by Ross and Frank Durbin, both driving Stanley cars. Ross won in 5:08 3-5.

Beside record breaking, much interest was lent to the occasion by close competition in several of the events. The real race in the final of the five-mile race for cars weighing 1,432 to 2,204 pounds developed between the Renault of William Wallace and Webb's Pope-Toledo for second place. For four miles it was a see-saw affair between the pair, the Renault taking the lead in the stretch and losing it again at the turns, so that the result was not to be known until the last mile.

The second heat of the ten-mile free-for-all furnished considerable excitement. Frank Durbin, driving a Stanley, and Webb, with the Pope-Toledo, started. So close did they keep together after the start that as they crossed the line for the third time they were running abreast. In the next mile Webb gradually drew ahead. In the eighth mile a tire flew off of a driving wheel of his car, but he continued, and because of his commanding lead, was able to win out, although Durbin rapidly closed the distance between them and finished about 300 feet behind.

There were special races for Franklin and Stevens-Duryea cars, which for the most part were driven by their owners, and therefore these events received a considerable amount of attention from the sympathizing spectators.

There was also a special match race between A. S. Lee in a Pope-Toledo and A. E. Morrison in a Peerless. The race was for five miles. Lee took the lead soon after the start, and won in a walkover, Morrison retiring at the end of the first mile.

The weather and track conditions were excellent, and the attendance amounted to about 10,000.

A summary of the events follows:

One mile for electrics—W. B. Snow (Electromobile), first; James M. Clarke (Waverley), second. Time, 2:15.

Five miles for gasoline cars weighing between 881 and 1,432 lbs.—Frank Kulick (Ford), first; F. F. Cameron (Cameron), second. Time, 5:09 4-5.

Five miles exhibition—E. T. Fetch (Packard). Time, 6:43 2-5.

Match race for five miles—A. S. Lee (Pope-Toledo), first; A. E. Morrison (Peerless), second. Time, 5:58 2-5.

Five miles for gasoline cars weighing between 1,432 and 2,204 lbs.—H. L. Bowden (Mercedes), first; William Wallace (Renault), second. Time, 4:41 2-5.

Five miles for Stevens-Duryea cars—C. D. Snow, first; W. J. Chapman, second. Time, 7:44 2-5.

Five miles for Franklin cars—Dr. W. L. Munro, first; R. Lincoln Lippitt, second. Time, 8:37 1-5.

Ten miles, free-for-all—H. L. Bowden (Mercedes), first; A. C. Webb (Pope-Toledo), second. Time, 9:13.

Five miles for touring cars—A. S. Lee (Pope-Toledo), first; J. A. Foster (Winton), second. Time, 6:13 2-5.

Five miles for steam cars—L. S. Ross (Stanley), first; Frank Durbin (Stanley), second. Time, 5:08 3-5.

The Copenhagen International Automobile and Cycle Exhibition is to be held between March 15th and April 9th, 1905, and will be open for eight days.

Vanderbilt Cup Race.

The list of possible starters in the Vanderbilt Cup race to be held on October 8 is now complete, as the entries were officially closed on September 8. Twenty cars have been nominated; seven of American and thirteen of foreign manufacture. Of the latter, two are nominated by the Automobile Club of Turin, Italy; five by the Autumobile Club of Germany, and six by the Automobile Club of France.

The committee in charge has given much consideration to the problem of making the course as safe as possible for both spectators and contestants. A large force of special police will patrol the route, and all intersecting roads will be barricaded with wire fencing. The roads will be scraped where needed, and the whole route will be oiled, according to arrangements between Mr. Vanderbilt and the A. A. A. Race Committee.

It has been decided to fix the starting and finishing points near Westbury, and the Racing Board has been empowered to erect a grandstand there which shall have a seating capacity of 400. President Roosevelt, Governor Odell and Mayor McClellan are to be invited to occupy boxes.

The cars will be started at three-minute intervals. The timing will be done by the Chronograph Club, of Boston, and telephonic communication will be established between controls, important points along the course and the headquarters of the race committee, which will be located at the Garden City Hotel on October 6, 7 and 8.

The controls at Hicskville and Hempstead will be "penalized," *i. e.*, no supplies can be taken on or repairs made at them without a loss in running time. It has been decided that no one be permitted to drive over

ourse at a rate in excess of the legal before the day of the race, under pen- of disqualification.

e official nominations follow: By the A.: Rollin T. White (White), Webb (White), Frank Croker (Smith & ey), A. C. Webb (Pope-Toledo), H. yttle (Pope-Toledo), Joseph Tracy al), and Chas. Schmidt (Packard).

the A. C. of Turin, Italy: Alfred G. erbilt (Fiat), William Wallace (Fiat).

the A. C. of Germany: C. G. Dins- (Mercedes), S. B. Stevens (Mer-), E. R. Thomas (Mercedes), George a, Jr. (Mercedes), and Isidore Worm- Mercedes).

the A. C. of France: Albert Clement ent-Bayard), Mr. Heath (Panhard), arte (Panhard), W. Gould Brokaw ult), Panhard & Levassor (Panhard) Dietrich.

t before going to press it is announced the White cars cannot be completed dequately tested before the race, and herefore not be started.

Racing Notes.

racing board of the A. A. A. has de- to investigate the character of tracks which automobile races have never held before sanctioning any meets to d on them.

e meets have been held within the past at Worcester, Mass., Milwaukee, ourg, Ill., and Nashville, Tenn. kmaking in connection with automo- ice meets came into being at a recent m meet. A member of the racing of the A. A. A. is quoted as saying he association is bitterly opposed to g at the meets and it is probable that acion will soon be taken against it.

races at Bennings, Washington, , on Labor Day drew nearly 10,000 . The chief event—the race for the ington Post Cup—was won by A. L. n a Ford.

tor Delivery Wagon in Interurban Service.

By Albert L. Clough.

Annis Flour and Grain Co., of Man- r, N. H., has been for some time em- g a Knox delivery wagon in what is d to be rather unique and unusually is service. The Annis Company ins several large stores in Man- r, and has lately opened one in a, 17 miles down the Merrimac from that city. Its business is in ale groceries, fruit and vegetables, handles an enormous quantity of per- goods for the supply of retail deal- these two cities. Carload shipments duce, fruit and groceries are received Manchester store from distant points, quire to be immediately distributed n the Manchester and Nashua branches in accordance with the existing demand, and it is of the utmost importance that perishable goods be handled with the utmost expedition in order to avoid excessive loss. It is in this service that the motor delivery wagon is being used, making one and sometimes two trips daily over the 17 miles of country road between the two towns.

The goods now handled by motor were formerly distributed by express, and, unless shipped early in the day, delivery was sometimes delayed until too late to allow of a profitable disposal of the goods, or to prevent their becoming spoiled in transit. With the motor, goods can be delivered at the Nashua branch in an hour and a half after leaving the Manchester store. The express rate between the two cities is 40c. per hundredweight, and large shipments of perishables having been necessarily handled by express previously to the introduction of the motor, the expense involved was very large. Now the motor frequently handles loads upon which the express would be $12, and delivers them at their destination within two hours of the time of loading.

Near the Nashua end of the run are located extensive market gardens, and the car frequently carries on its return trip a full load of garden truck for the supply of the Manchester stores. In this manner the wagon is made to operate profitably during the round trip.

In case either the Manchester or Nashua stores are overstocked with any particular commodity, the excess may be carried to the other end of the line where the demand is better. If higher prices are ruling upon a certain article in one city than in the other, it is sometimes found profitable to move a portion of the stock to the end of the line, where it may be profitably sold. Occasionally, too, it is found cheaper to buy garden truck at one end of the line and convey it to the other than to pay the higher prices there ruling.

This delivery wagon is equipped with a 16 horse-power double cylinder air cooled engine of 5-inch bore by 7-inch stroke, and a two-speed planetary gear. The sprocket ratio is 10 to 39, the wheels are 32 inches in diameter, shod with 2½-inch Firestone tires, and the wheel base is 96 inches. On the high gear the vehicle speed is 12.2 miles per hour at 500 engine turns per minute, and 18.3 miles per hour at 750 engine turns.

The average useful load carried is in the vicinity of 2,500 pounds, and the dead load 2,780 pounds. In addition to the operator, who is a capable machinist and takes entire care of the car, another man is usually carried. About six gallons of gasoline are usually consumed in the round trip of 34 miles. The wagon has been in service since about July 1, and has made regular daily trips since that time. On quite a proportion of the days, two round trips have been made, and on several occasions enough additional running about town has been done to bring the mileage up to the hundred mark. The highway between Manchester and Nashua is almost entirely common, unimproved country road, and, as it follows the river rather closely, is naturally quite sandy. There are also several hills of rather steep gradient and very stony surface. People touring over this road usually call it quite a hard one, but the wagon negotiates it with very little recourse to the low gear and in one hour and a half running time. During the winter the service will necessarily be discontinued, but as there is very little highly perishable material to be handled at that season of the year, there would be no object in maintaining it, even if it were possible.

This use of the motor delivery in interurban service carrying highly perishable material demanding instant handling, between the branch stores of a single concern, is evidently one of the most successful uses to which the new power can be put. The service rendered by common carriers is necessarily only performed at stated intervals, and considerable periods of time are necessarily wasted in collecting the merchandise at railroad stations, billing it, loading it on the cars, unloading it, checking up bills, loading into delivery wagons and carting it to its destination. In a short haul of about the length here demanded, these losses of time form a substantial portion of the whole, and are entirely obviated by the use of the motor vehicle which runs directly between the loading and receiving points. Further, the rates charged by common carriers for these short hauls are usually at a very high rate per mile, in order to pay handling and clerical expenses. The motor delivery is capable of taking on its load at any hour of the day, on any day of the week and of carrying it to the exact delivery point desired, thus possessing a flexiblity in performance which cannot otherwise be attained.

In this particular instance, at least, the use to which the car is being put is proving very successful financially, and the owners state that it is saving them in express charges avoided, in decreased loss in perishable and in extra profits on goods carried to a more profitable market a sum of money considerably in excess of that required to pay its operating cost and fixed charges. Other motor wagons will be added to the service in the near future.

We read in our French contemporary, *La Locomotion Automobile*, the following news item: "On August 19, at Newport, Smith & Mabley, the well-known manufacturers, covered on board their automobile boat, the famous Vingt-et-Un, a distance of 2,567 miles without stop." Twenty-five hundred miles in one day sounds rather strong, but that is no reason why the Frenchmen should not believe it—is not this the "country of unlimited possibilities"?

Five Hundred Miles in a Gasoline Runabout.

By W. Webster Ensey, M. D.

He who owns an automobile and has never extensively toured with it is missing one of the pleasures that makes life worth living. At least this was the theory of my wife and myself, so we determined to put it to a practical test and find out for ourselves its truth or falsity. Hence, on August 12, 1903, about 9.30 A. M., after bidding good-bye to our family and friends, I turned the crank, threw in the clutch and we were actually started on the trip which we had planned during the preceding two or three months.

The machine is one of the popular curved front runabouts, which was purchased May 12, 1902, and had been in almost constant use in my practice since. Instead of the deck over the rear of the body, I had in-about eight inches deep. This box was filled with wrenches, hammers, jacks, rubber and asbestos packing, rubber hose, lubricating oil, cup grease, plain iron wire, insulated copper wire, tow rope, dry cells and various small parts for the machine in case of breakage. On each side of the body was fastened an extra tire. Back of the seat we had strapped a rubber rain cover, and my wife carried a camera. In front was an extra two-gallon can of gasoline and a half gallon of our famous Dayton holly water. This we took along for drinking purposes, as it is free from disease germs, and we did not care to assume the risk of getting typhoid fever, dysentery, etc., which were so prevalent through the country last summer. This water was in a bottle which had formerly contained alcohol and still had the conspicuous label on, and you can imagine the curiosity and horror with which some men at one of our stopping places saw my wife tip up this bottle and take a big drink of what was labeled pure alcohol and to all intents and purposes looked like pure alcohol. Seeing their questioning glances, I made the proper explanation, but my wife could not be prevailed upon to take another drink when any one was around.

All went well till we were just leaving the city, when the wire operating the muffler cut-out broke. This was fixed in about 15 minutes, and the trip resumed. Our objective point was Toledo, Ohio, about 160 miles by road north of Dayton. We took the new Troy pike from Dayton, straight north through Chambersburg, Vandalia and Ginghamsburg to Troy, the distance being 20 miles. This road is hilly, but usually in better condition than the old Troy pike. Troy is a beautiful little town of about 6,000 inhabitants and is the county seat of Miami county. We reached there at noon, stopping long enough to write postal cards to the folks at home and then proceeded on our way to Piqua, eight miles north. Piqua is a hustling town of about 10,000 population, containing a number of manufacturing plants. It was the site of a fierce battle between Gen. George Rogers Clarke and the Shawnee and Miami Indians in 1782.

We arrived at Piqua at 1 P. M., and stopped at the postoffice to write more postal cards. (We wrote cards at all the principal places we passed through.) Later we called upon a professional friend and spent a very pleasant half hour at his office. After filling the water tank and oiling the machinery we again took up our journey.

About four miles north of Piqua we noticed a beautiful grass plot alongside the road, shaded by a large elm tree, making an ideal place to stop for lunch. For a half mile before reaching this spot I had noticed that the car was difficult to steer, therefore, while my wife was laying out the fried chicken and other good things she had prepared, I inspected the machine and discovered a horseshoe nail in the left rear tire which was deflated. This partially spoiled my appetite for lunch, but as man does not live by wind alone (even if it is absolutely necessary in a pneumatic tire), we managed to satisfy the inner man ere I tackled the tire repair. The jiffy gun was used quite awhile before it was learned that the nail had punched a lot of holes through the other side of the air tube. The tire was removed, one of the extras substituted, and we went on our way rejoicing.

We passed through Kirkwood, and at 4 P. M. the smoke stacks and court house dome of Sidney, the county seat of Shelby county, having 6,000 population, appeared in sight. About this time a leak was noticed at the outlet pipe of the water tank, which necessitated filling the tank every seven miles or oftener. As usual, we visited the postoffice, then, at 4.15 P. M., left Sidney for Wapakoneta, passing through Swanders, Anna and Botkins. As far as Sidney the pikes had been fine, but between Sidney and Wapakoneta the Western Ohio Traction Line was being constructed along the turnpike, and the road was one succession of little hillocks which rendered traveling exceedingly slow. This, combined with the frequent stops necessary to fill the water tank, delayed us, so that we did not reach Wapakoneta, 60 miles from Dayton, till 6 P. M. This handsome little town, the county seat of Anglaize county, contains about 5,000 people.

While riding along the main street, we were hailed from the sidewalk. Pulling up to the curb we were greeted by a friend from Dayton, who was waiting for the train. He asked whether it is customary to ride on flat tires, and called my attention to the fact that the left rear tire was punctured. I replied that we usually preferred our tires inflated. When he had departed for his train, I ran the machine on a vacant lot at one side of the street. Surrounded by a very interested crowd of spectators and entertained by numerous witty remarks, surmises and suggestions, and protected by the official dignity of the town marshal, the remaining extra tire was put on in place of the disabled one. This used up my extra tires, but fortunately we had no further tire trouble on the way north. By this time it was 7 P. M. and getting dusk, so, inquiring the road and saying good-bye to our good friends who had assisted us in every way they could, we pushed on to Lima, 15 miles north, where we planned to put up for the night.

The road was excellent, and we did not light the acetylene headlight until within five miles of Lima. Here we obtained our first view of the natural gas and petroleum fields of Lima. The sky was lurid with the flaming natural gas torches, the flames leaping 20 and 30 feet into the air. These furnish illumination while the pumping of oil and drilling of new oil and gas wells go restlessly on. It was 8.20 P. M. when we stopped the car in front of the Norval Hotel, the leading hostelry of Lima. While

A Pretty River View.

:re registering the clerk called up the e, and a man was sent to run the ne to his place of business. Ordering ater tank soldered and the two tires ed if possible, we washed all the pul-d real estate off our faces and hands, nade ourselves presentable for polite y. Needless to say, our supper was ed to the full. After writing a few cards and a couple of letters, we re-and, lulled by the hourly striking of ourt house clock across the street, fell restful sleep. Our day's trip covered les through five counties, and our mis-comprised one broken wire and two ures—not a bad day's record for a runabout. Three gallons of gasoline consumed.

: next morning was cloudy and threat rain, but the repairs detained us till o'clock, by which time the sun was g brightly. We filled the gasoline and tanks and oiled and inspected the ma-ry before starting. For a mile or so f Lima the road was covered with ed stone, which is exceedingly hard res, but makes a fine hard roadway thoroughly packed. Altogether, while oads north of Lima were good, they not kept up as well as the pikes south t city, and in bad weather become soft nake difficult traveling.

passed through Cairo (six miles), nbus Grove (11 miles), to Ottawa (23), the county seat of Putnam county, we reached at noon. The view from ragon bridge crossing the Blanchard at Ottawa was so beautiful we un- the camera and took our first pic- The focus slipped, however, while ng the bulb, and the negative was d. After that we were more careful. wagon bridge was washed away last by the ice gorges. A short distance Ottawa we stopped under the shade tree in front of a country crossroads l house, and ate our lunch. On in-g the road to Leipsic, seven miles Ottawa, we were told that we had got e wrong road and would have to go o the next road, which would take us ly to Leipsic. We generally followed ighway with the most telegraph and one wires and found we were usually but on this occasion we somehow got ned off.

m Leipsic to Deshler (13 miles) we sed a dirt road, which was in good ion, as the weather was delightful. oad made a good many turns, but we no trouble in following it. For the ime on the trip the engine now began ss fire. Gasoline regulation did not natters, so about a mile south of Desh-e stopped to clean the spark plug, te the vibrator on the coil, and fill the tank. The engine then seemed to run , and in a few minutes we were in the of Deshler. This is a dead-in-the-town in which we saw only two men; the rest of the population seemed to have successfully hidden themselves away. We asked the first man the road to Grand Rapids, Ohio, but he simply stood with his mouth agape, staring at us as though we had dropped from the sky. The second man gave us the desired answer, pointing out the road and telling us to follow it straight north for 11 miles, and it would take us to the river road skirting the Maumee River, two miles west of Grand Rapids. This information proved correct, except we afterward found that the distance is 16 miles instead of 11. This stretch of road is very sandy in places, but we had no difficulty in pulling through on the slow speed. Shortly after leaving Deshler the engine again began to miss fire, so I stopped and carefully went over all the battery wires and was rewarded by finding two of them hanging merely by one or two of the thin wires of which the cable was composed. Two new wires were soon installed, and the engine ran with its pristine vigor and regularity.


THE MAUMEE RIVER.

It was just sunset when the Maumee River burst upon our vision. The golden sun setting beyond the hills and forests of the farther bank, and the shimmering waters of the river in the foreground furnished a scene that caused us to stop the machine and gaze in admiration at the beauties of nature. The road follows the meanderings of the river, up and down hill, all the way to Toledo, 27 miles. The banks of the rver are dotted with thrifty farms, towns and a few clubhouses, making the journey anything but monotonous. Several good views of the Maumee River were impressed upon photographic plates, reminiscent of our visit.

At Grand Rapids two gallons of gasoline were purchased as a matter of precaution and the water tank filled. During the severe floods of last spring this town, although situated high on the bluffs, was inundated to a considerable extent by water dammed back by the ice. The road was rapidly gliding beneath the wheels, and we had great expectations of reaching Toledo that evening, when, just before dusk, on the outskirts of Waterville, 16 miles from Toledo, we suddenly ran into a part of the road that had been plowed up its full width to a depth of 18 inches preparatory to putting in a stone pavement. There were no signals of any kind to warn us of the dangerous spot. In attempting to pull out the chain tore apart. We were just in front of a farm house, and the occupants very kindly furnished a lantern while I slacked the chain and put in a new link. During this operation four or five horse vehicles passed and when they struck that stretch of road the drivers gave the impression that the English language was utterly inadequate to express their sentiments. I have no doubt it is a pleasure to drive over that same road this season. By this time it was pitch dark, and, as the road was not familiar, we accepted the invitation of our new-made friends and ran the car into their barn. This barn, by the way, is a new one and is said to be the largest in Wood county. My wife and I crossed the river on the big bridge and spent the night at one of the hotels in Waterville. The big bridge was also swept away this last spring by the ice gorges.

The next morning, having looked over and oiled the machine, we started on the remaining 16 miles between Waterville and Toledo. The road is a good stone highway, and we made excellent time. At this point the valley of the Maumee is historic ground. Near Maumee City we passed the celebrated Turkey Foot Rock, with the legends regarding which every reader of history is familiar. At South Toledo is located a brick school house, the yard of which contains numerous large forest trees. A signboard notifies the passerby that on that

very spot (the present trees probably being witnesses) Col. Dudley, of Kentucky, and 800 Kentuckians were taken prisoners by the Indians and 350 of them massacred and scalped. A little farther on another signboard informs the reader that he is on the site of Fort Miami, which was occupied by the British in the war of 1812. Across the river, near Perrysburg, the remains of Fort Meigs are still visible. This fort was occupied by the Americans, and a fierce artillery duel was fought by the two forts, the British being compelled to evacuate their position and retreat.

Six miles from Toledo the engine again began missing fire, and as the wires seemed to be intact, I thought the batteries were becoming exhausted, so used the new cells which we brought. We entered the city along Broadway, passing Walbridge Park and the Toledo water works and tower en route. Broadway is a brick and stone paved street in very dilapidated condition. Leaving Broadway, we turned into Monroe street, which is paved with asphalt, but was at that time full of chuck holes. We could have found better streets (Madison or Jefferson avenues), but did not know it till afterward. Passing the beautiful residence and grounds of Mayor Sam Jones, called "Tany Dderwen," which is Welsh for "Under the Oaks," and many other handsome homes of some of the wealthiest of Toledo's citizens, we reached Maplewood avenue, our destination.

After several days spent in rest, on Tuesday, August 18, my uncle and I started for Detroit, a trip of 65 miles by road. We left Toledo about 9 A. M. by way of Detroit avenue, the road being a continuation of the same. Part of the avenue was paved with Nicholson blocks in a shamefully neglected condition. The Michigan State line is about five miles from Toledo, and there the good roads abruptly ended, and we had more or less sand to contend with. Michigan does not seem to take the same interest in good roads as is manifested in Ohio, at least not in the southeastern part of the Commonwealth.

(To be Concluded.)

A Progressive Western Town.

La Belle does not propose to be outdone by other towns, the latest acquisition being an automobile, the property of Fred C. Lyon, one of our progressive farmers. The "devil wagon," when it reaches here, will create about as much curiosity as did the advent of the railroad thirty-two years ago. With an electric light plant second to none, a coal mine, granitoid walks and an automobile as new acquisitions, La Belle isn't to be sneezed at.—La Belle, Mo., *Star.*

George W. Collins, of Bridgeport, Conn., has invented a cap for gasoline or oil tanks which will indicate the quantity contained in the tank.

MINOR MENTION

Eighty-five automobiles and three motor cycles have been registered in Dayton, Ohio.

It is reported that the Phelps Motor Vehicle Co. expect to turn out about 125 cars next year.

William L. Duck has been appointed manager of the London branch of the Winton Motor Carriage Co.

The Carey Manufacturing Co. of Fairmount, Ind., are to place a new car on the market within a few weeks.

It is reported that the Matheson Motor Co., Ltd., of Holyoke, Mass., is soon to remove its plant to Detroit, Mich.

Grout Bros. of Orange, Mass., expect to have their 1905 side entrance tonneau model on the road within a few weeks.

The Mahoning Motor-Car Co. has been organized in Youngstown, Ohio. Their first car was given a road test last week.

Up to September 1, 289 automobiles had been registered in the Province of Ontario. For the year 1903 the figure was 180.

Gray & Davis, the lamp manufacturers, of Amesbury, Mass., are building an addition to their factory, 50 x 100 feet, three stories high.

S. M. Butler has resigned as secretary of the racing board of the A. A. A., owing to the pressure of duties as secretary of the A. C. A.

An organization of automobilists of St. Paul and Minneapolis is endeavoring to have built a macadamized road between the two cities.

George Roberts of Crookston, Minn., has converted an old stage coach into an automobile by the application of steam driven power mechanism.

William Caldwell, of Portage, O., has been sued for $250 damages by Samuel Warden, whose horse was frightened by the defendant's motor car.

R. C. Routledge, formerly of Messrs. Thomas F. Smith & Co., New York, has taken charge of the contract department of the H. W. Johns-Manville Co.

Ground has been broken for the plant of the R. E. Olds Co. at Lansing, Mich. The proposed lay-out of the grounds provides for four main buildings and a testing track.

The Gibbs Engineering Co. of Glendale, L. I., who have been engaged in the manufacture of electric commercial wagons, have been petitioned into involuntary bankruptcy.

We are informed by Norris Mason that he has sold out his interest in the Michelin Tire Agency to G. G. McMurtry, Sr., and will have no further connection with the company.

The handbook of the Association of Licensed Automobile Manufacturers, announcement of which was made in our columns some time ago, is now ready for distribution.

Plans are on foot to form a $10,000 stock company among the automobile owners of La Crosse, Wis., which will operate a garage and repair shop for the use of the stockholders.

Motorists of Tacoma, Wash., are soon to combine for protection against the hostility of the farmers residing in that locality. It is said that stoning has been very prevalent of late.

C. H. Tyler is now Eastern representative of the National Motor Vehicle Co., Indianapolis, and George M. Dickson has been placed in charge of their exhibit at the St. Louis World's Fair.

The Ohio Valley Automobile Co. has been organized in Portsmouth, Ohio, with Elwood Kinner president and Dr. J. L. Sowards secretary. Their business will be the buying and selling of automobiles.

An ordinance recently passed by the City Council of Moline, Ill., provides that gasoline can be sold only in cans painted red, or if in jugs or bottles they must bear red labels reading "Gasoline—Dangerous."

Horace B. Day, New York agent for Queen cars, has leased his garage at 60 West 43d street, and will occupy a portion of the main floor of the new automobile department of E. J. Willis, at 17 Park Place.

A. L. Dyke, St. Louis, informs us that he has severed his connection with the A. L. Dyke Auto Supply Co. and that he is working on a new book publication—"Remedies for a Gasoline Auto and All Electrical Connections."

F. W. Ofeldt & Sons, Brooklyn, N. Y., wish to apologize to about 250 firms and individuals in the trade for not having sufficient postage on their new pamphlet. This number had been sent out before it was noticed that the weight was just over an ounce.

At a meeting of the North Jersey Automobile Club, of Paterson, recently, the following officers were elected: President, G. A. Post; first vice-president, F. R. Reynolds; second vice-president, Frank Van Cleve, and secretary and treasurer, Robert Beattie, Jr.

Palmer & Christie, 239 West 50th street, New York City, have taken the agency for America (U. S. and Canada) for the Martini cars made in Switzerland. They have also taken over the garage business formerly conducted by Alexander Fischer at the above address.

A collision between a motor car and a horse drawn vehicle occurred near Burlington, N. J., on September 10 in which five persons were seriously hurt. The driver of the horse mistook the two side lights on the car for bicycle lanterns and endeavored to drive between them.

The proposed endurance test of the Automobile Club of California on September 21 will be run from San Francisco to Los Angeles only. It was originally planned to include a return trip but the club has decided that the run one way will provide a sufficient test for the cars.

The St. Louis Automobile Club has been incorporated. Its capital stock is $20,000, and it is empowered to hold lands, buildings and privileges on water or land, in or about Lachine, or elsewhere, to erect club houses, for the purpose of promoting and assisting in the use and exercise of automobile and other sports generally.

Club Notes.

R. I. A. C.

A series of races for non-professional owners will be held at Narragansett Park during the fall.

PITTSBURG A. C.

The club has, within the past week, taken possession of its new club house at the corner of Baum and Beatty streets. The club membership is now 250.

A. C. OF PHILADELPHIA.

The Club is preparing a set of road maps covering the territory in Pennsylvania and New Jersey likely to be covered by members touring within a hundred miles of their home city.

L. I. A. C.

An invitation has been issued to competitors in the Vanderbilt Cup race, and to members of clubs affiliated with the A. A. A., to make use of the garage and club facilities while in attendance at the cup competition.

LYNN (MASS.) A. C.

Arrangements have been made to incorporate the club in the near future. At a recent meeting it was decided to have the bylaws, the list of members and the numbers of their cars printed in a booklet for distribution among the members. The House Committee is endeavoring to secure permanent quarters and a suitable garage.

A. C. OF SEATTLE, WASH.

Organization was effected on September 4 with a membership of twenty-three. Directors were elected as follows: Herman Chapin, C. L. Roy, C. D. Stimson, F. D. Seymour and Dr. C. G. Holcomb. A committee was appointed to confer with the Streets Committee of the City Council in regard to the proposed automobile ordinance.

A. C. OF HARTFORD, CONN.

Articles of association have been filed with the Secretary of State of Connecticut. The association is formed to promote the interests of automobiling, and to aid in protecting the legal rights of the members. The corporators are: J. Howard Morse, Leonard D. Fisk, A. W. Gilbert, Frederick S. Belden, W. T. Plymouth and Thomas W. Hooker.

LOWELL (MASS.) A. C.

The first run of the club was held on Saturday before last, the destination being Beach Bluff, beyond Salem. A lunch was served at the Preston House and the run back to Lowell made during the evening. Among those who participated were: H. H. J. Reed, N. D. Goff, W. H. Green, J. C. Wadleigh, Frank H. Putnam, William Walsh and Mr. Harris.

A. A. A.

The regular monthly meeting of the Board of Directors was held on Tuesday, September 6, and was attended by Messrs. Whipple, White, Farrington, Pardington, W. C. Temple and Emerson Brooks. The resignation of S. M. Butler as secretary of the racing board was accepted, and the board confirmed the sanction, granted to La Roche for his non-stop run by Chairman Post of the Touring Committee. The Racing Board reported as to the state of affairs in connection with the Vanderbilt Cup race.

CHICAGO A. C.

Details have been arranged in connection with the race meet to be held at Harlem Track on September 30 and October 1. The directors have appointed a committee to take charge of the meet, composed of F. C. Donald, chairman; John E. Frye, Jerome A. Ellis. They have also decided to petition the city council to construct an automobile speedway. It is proposed to hold another series of brake tests to which the Park Commissioners will be invited. The club will affiliate with the National Good Roads Association.

Mr. Lillibridge's White in the St. Louis Tour.

Ray D. Lillibridge, whose White car was driven in the last stages of the recent St. Louir tour by Mr. Sonnanstine, has asked us to state that the trouble which his car experienced in the last day's run consisted merely in a broken steam connection between the generator and engine,and was set right again within a few minutes. The report, he says, that the car blew up is entirely false.

LEGISLATIVE AND LEGAL.

The police of Bridgeport, Conn., have been ordered to strictly enforce the speed laws.

The Chicago police have adopted a system of flash light signals with which to time automobilists at night.

The automobilists of New Hampshire are endeavoring to secure the passage of a State law regulating the use of motor cars.

A vigilance committee has been formed among the citizens of Deerfield, a suburb of Chicago, to prevent automobile scorching.

On Sunday, September 11, the police of Brooklyn, N. Y., placed two automobiles in service on the frequented drives for the purpose of catching automobile scorchers.

The City Council of Moline, Ill., has passed an ordinance which limits the speed of automobiles to ten miles an hour and requires registering and the numbering of cars.

The Springfield, Ill., Automobile Club will soon take steps to test the legality of the order of the Park Board, which forbids the driving of cars in the parks after 6 P. M.

Peter D. Martin, whose chauffeur was recently sentenced to five days in jail by a Newport, R. I., judge for exceeding the limit of speed, has given bail for him and will contest the case.

Police Judge Whelan, of Cleveland, recently fined a chauffeur $50 and costs for exceeding the speed limit. This is the most severe penalty yet inflicted in Cleveland, and is the limit under the city ordinance.

The case of Coke Flannagan, of Glen Ridge, N. J., who is being prosecuted for throwing stones at automobiles on the complaint of Robert L. Johnstone, has been held over to await the action of the grand jury. The details of this case were given in a previous issue.

Commercial Vehicle Notes.

A new automobile chemical fire engine has been placed in service in New London, Conn.

There are prospects that an automobile line will soon be established between Joliet and Manhattan, Ill.

The aldermen of Grand Rapids, Mich., are considering the advisability of adopting motor propelled street sprinklers.

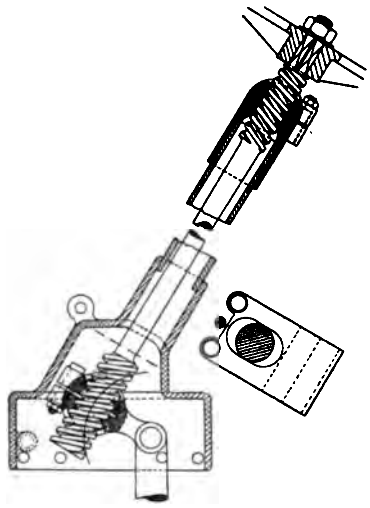
It is proposed to establish an automobile line between Washington, D. C., and Sandy Spring, Md., for the transportation of passengers and light freight.

MOTOR VEHICLE PATENTS.

United States Patents.

769,543. Friction Clutch.—James G. Heaslet, of Philadelphia, Pa., September 6, 1904. Filed November 14, 1903.

The driving and driven shafts are in line, a reduced end portion of the former extending into a bearing formed in the end of the latter. The driving shaft carries a flywheel with solid web, from which extend lateral studs carrying sleeves with shoulders at both ends. To the end of the driven shaft is secured a friction disk provided with two diverging elastic plates. Two clamping plates, one on either side of



No. 769,176.

the just-mentioned friction disk, are secured on the sleeves on the laterally-extending studs, one abutting against the inner shoulder and the other moving freely on the sleeve. The outer plate is also formed with brackets, which support pivot pins on which turn levers with outer forked ends bearing against the outer shoulders on the sleeves, and inwardly extending ends which are pressed against by a grooved sliding collar on the driven shaft, which is pressed by a coiled spring in the direction of the clutch. The pressure of the spring normally clamps the two clamping plates supported on the lateral studs, against the diverging elastic disks, thus coupling the driving and driven shafts together. The use of the diverging elastic disks insures smoothness of action. To disengage the clutch it is only necessary to compress the clutch spring by means of mechanism engaging with the grooved sliding collar.

769,455. Vehicle Body.—John D. Artz, of Dayton, O. September 6, 1904. Filed April 15, 1904.

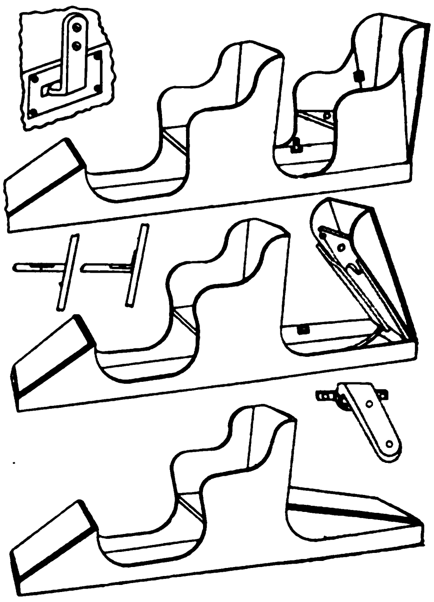
This patent relates to a convertible vehicle body for automobiles, with a folding rear seat. The body comprises a back panel hinged to its rear portion, and side panel extensions rigidly projecting from the back panel. To these extension panels are hinged folding panels and a seat panel which folds against it. The drawings clearly illustrate the idea.

769,176. Steering Gear for Motor Vehicles.—Eugene Mathieu, of Louvain, Belgium. September 6, 1904. Filed April 29, 1902.

This patent covers a steering mechanism of the "threaded shank and nut" type, and possesses the noval feature that the links usually employed in this construction to connect threaded sleeve with the lever arm are done away with. The steering shaft, to the upper end of which the steering hand wheel is secured, is cut with opposite threads at its opposite ends respectively. Each of these threads is surrounded by a correspondingly threaded sleeve of spherical shape, in two parts, which are clamped together by means of a slotted spherical socket. The shaft passes through oblong slots in these spherical sockets, and when it is turned around its axis to produce a steering motion of the road wheels, it slightly rocks around the center of the spherical socekt at the upper end or the steering post, as determined by the length of the lever arm which receives motion from the shaft. Owing to the threaded sleeves at both ends being made in halves and clamped in slotted sockets, any wear on the threads may readily be taken up.

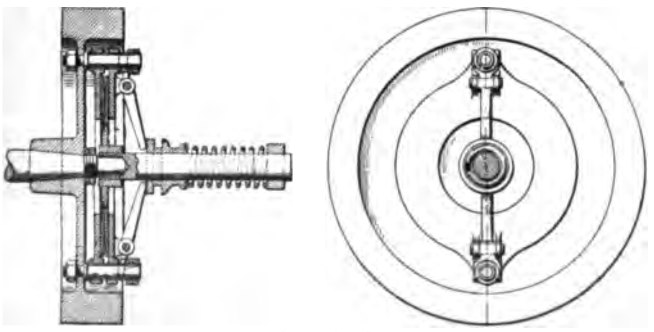
769,666. Tire. Alfred Papleux, Lyons, France. September 6. Filed May 8, 1903.

769,321. Clutch.—James W. Packard, of Warren, O. September 6, 1904. Filed July 7, 1903.



No. 769,455.

On the end of the power shaft is carried a loose pulley or drum with finished internal surface, and to the extreme end of the shaft is secured the hub carrying the movable clutch member, which by suitable mechanism provided may be expanded to grip the drum. To a spoke of the hub is pivotally connected an internally threaded block, and a similar but oppositely threaded block is connected to one arm a bell crank. The other arm of this bell crank is connected by an adjustable link with a bracket on one end of the expanding clutch member. A short shaft with right and left-hand threads passes through the two oppositely threaded blocks and carries a simple pinion in engagement with a rack connected to the sliding collar on the shaft. This sliding collar is forced toward the clutch by means of a coiled spring, and any motion of the sliding collar in that direction is transmitted through the rack and pinion, and the oppositely threaded shanks and nuts, to the free end of the expanding clutch member, causing it to expand and grip the inner surface of the clutch drum. The clutch may be released by compressing the clutch spring by means of a pedal.



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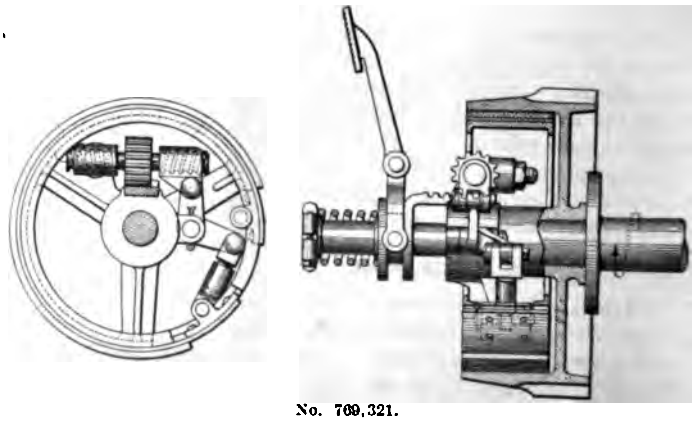

No. 769,321.

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Limitations of Single Cylinder Construction.

The automobile public is constantly clamoring for motor vehicles of higher power and greater capabilities, and this demand is very strong among the users of cars of the runabout class, who are frequently reminded of the inferiority of their vehicles in road service in comparison with high-powered cars.

The engines of these runabouts have, season by season, been given higher ratings by their manufacturers, and this increase in nominal output has been in great part, though perhaps not entirely, warranted by actual increases in the sizes of the motors.

It is evident that the development of the single cylinder runabout design, with planetary change speed gear, is being pushed to the extreme limit as regards power output, in deference to a popular demand, and indeed it is not improbable that some manufacturers in their efforts in this direction have overstepped the bounds of good mechanical judgment

Neglecting possible improvements in mechanical efficiency and in improved quality and freedom of entrance of the gaseous charge, the only important means by which the effective power of these engines can be increased, is by enlarging the piston displacement or by the use of a higher compression pressure.

With present methods of engine balancing a limit of piston displacement is soon reached which proves as great as permissible from considerations of vibration. The large mass of the reciprocating parts required in an engine of much over five-inch bore and six-inch stroke is such as to render the attainment of a correct running balance very difficult, and the explosion reaction in an engine of this size is a still more serious matter. The public is becoming more and more critical of heavy vibration in motor cars, perhaps owing to its increasing familiarity with multiple cylinder types possessing inherent balance.

Certain single engines having cylinders of more than the above mentioned displacement have been generally admitted as failures in practice, as far as smooth running is concerned, and their manufacture will in all probability be discontinued. Indeed, experience generally seems to show that the permissible size of the single engine with present methods of construction is limited at about five by six inches.

Some manufacturers have recently made strenuous efforts after greater power by increasing their compression pressure from the usual 60 or 75 pounds per square inch to 85 or 90 pounds in a cylinder of a size in excess of five by six inches. While the explosion reaction in such an engine at nearly closed throttle is not excessive, the pulsation produced by the extremely high explosion pressure resulting from the increased compression is so noticeable under open throttle as to become almost prohibitive.

In some of the cars put out this year in which high compression and large bore and stroke are a feature there is reason to suspect that the practical capabilities of the single-cylinder design have been strained beyond the limits of good judgment. Apparently, it is a mechanical impossibility to maintain the bearings of such an engine, as at present built, in a condition perfect enough to prevent serious pounding or knocking when operating with the full charge. By the employment of much more liberal bearing surfaces on the crank shaft, crank pin and wrist pin and an engine structure of greater rigidity, it would doubtless be possible to maintain such an engine in operation for considerable periods of service without any serious "knock" being developed, but the extreme sensitiveness of an engine operating under these extreme

stresses, to the slightest looseness in any bearing or in its supports, renders it a delicate piece of apparatus to maintain. The strengthening of such an engine required to overcome these difficulties might be found to necessitate an added weight and an increase in width which would go far toward nullifying the advantages which are sought.

An engine employing so high a compression requires a very strong electrical discharge for its certain ignition under full charge, and the attempts to use batteries of four dry cells, as customarily employed upon low compression motors, have resulted in unsatisfactory service. It will be interesting to note whether large single-cylinder, high-compression motors prove popular with the public or whether the limit of the compression pressure is not substantially reached at about 70 pounds in single motors of limiting bore and stroke. If this should prove to be the case, it may be assumed that the single-cylinder runabout, except for minor improvements due to reduction in engine weight, has come to the limit of its effective power.

The Question of Equipment.

The National Association of Automobile Manufacturers is about to consider the proposition of an agreement among its members regarding standard equipment. The question of just what parts and accessories should be included in the equipment has proven quite a problem to the individual firms, and could be solved much easier collectively, in which case it would practically be disposed of once for all, while now it is an ever doubtful question. At present practice in this respect is widely divergent. Manufacturers of the cheaper cars usually include in their equipment only the most necessary articles, while those of high-priced cars make it a point to furnish a very complete equipment, and their salesmen, as a rule, dwell much upon the importance of this feature.

Naturally every manufacturer furnishes a tool equipment, and as the nature and number of tools furnished must depend largely upon the individual design of the car, there is nothing to agree upon in this matter. The parts of the equipment in regard to which practice is indefinite, and which would form the main subject of the agreement are the lamps, speedometer and odometer. A complete lamp equipment includes an acetylene searchlight, two oil side lamps and an oil tail lamp. All of these are required for touring, and it would therefore only be reasonable to include all in the equipment of a touring car. At present very few manufacturers furnish the searchlight, but the almost universal use of such lights the present season on all cars adapted for touring may result in the manufacturers reaching a decision to include it in a "standard equipment for touring cars" in future. There are substantially three alternatives in the matter of lamps—equipping cars with side and tail oil lamps only, equipping all cars with side and tail oil lamps and an acetylene headlight, or furnishing the former equipment with runabouts and the latter with touring cars.

Odometers are now furnished as part of the regular equipment on many cars, both low and high priced. They may be regarded as a necessity on electric vehicles and a great convenience on others, and as their cost is so small in comparison with that of the car and they are of great practical value, especially in touring, it is probably only a question of time when they will be furnished with practically all cars.

With respect to speedometers, the case is somewhat different. These are at present relatively expensive, and their inclusion in the regular runabout equipment could not be thought of. It might, however, be to the advantage of the industry if speedometers were more generally used on touring cars, and as their inclusion in the regular equipment would undoubtedly result in an appreciable reduction in price, thus making their general use more feasible, it may not be a bad idea to make the speedometer a part of the regular outfit.

We have here spoken of a differentiation between runabouts and touring cars, but in practice it might possibly be found better to differentiate on the basis of price, as this would be less likely to give cause for misunderstandings.

The question of equipment is a three-sided one, interesting the accessories manufacturer, the automobile manufacturer and the purchaser. Practically all well-established accessories manufacturers, we believe, are in favor of their lines being included in the regular equipment, for though this may have a tendency to reduce the margin of profits, it insures the widest possible market for their goods. The automobile manufacturer and the purchaser are really less interested in the completeness of the equipment which may be decided upon. The former does not expect to make any profit on these accessories, while the purchaser in any case pays for just what is furnished. Uniformity of practice, is a desideratum, however, as it admits of a more ready comparison of prices, helpful to both manufacturer and purchaser.

Town Signboards.

We notice an excellent suggestion made in a daily paper, viz., that towns and villages would do well to have their names placed either on the post office or on sign boards at all the important road entrances, for the convenience of tourists, and the good of the towns themselves. When an automobile touring party arrives in an attractive place, they are always anxious to learn its name, and are obliged to stop and ask for it, while if it could be read from a signboard, they would be saved this trouble. In Continental Europe such signs are placed along all the main highways at the entrance and exit of each town, giving not only the name of the place, but also the county in which it is located, and still other information usually of no particular interest to the tourist. American automobilists who have toured the Continent have found these signboards very convenient, for the reason that in connection with good road maps, they render questioning of natives regarding the route practically unnecessary.

The probable reason these signboards are unknown here is that the actual limits of the average American town are more or less indefinite and subject to constant change, particularly in the West, while the "corporation limits" of an enterprising western town are often so far out in the open country that the town proper is nearly out of the range of vision from the outskirts. In the East, conditions of greater stability obtain, and if signboards were erected it would not be necessary to move them every year or two, owing to expansion of the locality.

A good example showing the necessity of such signs is furnished by Hudson County, New Jersey. Along the Hudson County Boulevard, an excellent driveway for automobiles, is an almost constant succession of small towns, practically merging into each other. Nowhere along this boulevard are there signs to indicate the names of the towns, and the tourist is reduced to the un-

pleasant necessity of stopping pedestrians and inquiring of them.

Automobilists in all the smaller towns would do well to urge their town councils to erect such signboards, and the towns should do so of their own accord, as it would help to make them known abroad, for which purpose many towns are willing to spend considerable money.

Tops.

During the past year it has become the general costume to equip touring cars with canopy tops, either permanently secured in place or detachable. A top of neat construction and finish adds materially to the general appearance of a car, but it also consumes considerable power, and its presence on the car is therefore objectionable when weather conditions do not require it. This fact has recently become strongly impressed upon the automobile public, and as a consequence the demand is now largely for detachable tops. It is always advisable to carry the top when going on an extended tour, as the possibility of being overtaken on the road by a rainstorm is ever present, and with a top and side curtains tourists are almost as well protected from the weather as in a closed car. In extremely hot weather the top is also a protection from the sun, but for short drives during these fine autumn days, it serves absolutely no purpose and is therefore better left at the stable. The increasing demand for detachable tops is fully appreciated in the trade and many new tops of this kind will soon be placed on the market.

Although canopy tops have been used on horse vehicles for many years their application to fast-moving automobiles presented a new mechanical problem of no little difficulty. The greater speed entails greater vibration, and unless the tops themselves are made extremely light, the strains on the supports are very great. The upright rods or tubes will break off at their lower ends in course of time, or the fastenings tear from the body. Besides being light, the top must also be perfectly water and weather proof, and to combine these various qualities in a top of moderate cost is a more difficult problem than it may seem.

It is expected that the National Guard and automobile owners of La Crosse, Wis., will within a short time erect a building having a garage on the first floor and an armory on the second.

Locating and Remedying Spark Troubles.

By Albert L. Clough.

(Concluded.)

(c) A break or burn-out in the primary winding of the coil is so unlikely as to hardly require mention, but the connections of the coil terminals to the binding screws on the case of the coil, or to the vibrator, may have become loosened. An inspection of them will not be amiss.

BATTERY SWITCHES.

(d) It is unfortunately true that battery switches often make imperfect contacts, owing generally to reliance having been placed upon spring portions of metal which gradually lose their resiliency or break completely. In switches of the plug type the spring fingers with which the plug makes contact may have been bent out of a position of positive engagement, may have become dirty or corroded, or their connecting wires may have become loosened. Switches of the three-point variety for two sets of battery, which have a pivoted contact on the lever arm, sometimes make a poor contact at the pivot, owing to wear or loss of spring in the little brushes which are supposed to preserve the contact. The lever arm may lose its spring after long use and make an uncertain contact with the battery points.

Snap switches sometimes fail through weakening or breakage of the springs that throw the contacts from the "on" to the "off" position, and occasionally the spring brush contacts lose their resiliency and change their position, or break off entirely. In general, defects in switches are due to spring failure.

BREAKS IN CONDUCTORS.

(e) Positive breaks in the wiring are more easily found than partial breaks which are held in uncertain contact by the insulating covering of the conductor. Any particular wire which is under suspicion of being entirely broken, or "open," may be tested by placing the engine upon the sparking point, closing the switch and touching with the ends of a test wire, the two points to which the suspected wire is attached. If the current begins to flow when this is done the wire may confidently be condemned.

A wire which has in it a partial break, or a break held together by the insulation, may sometimes be tested out by freeing it from its supports and bending it sharply at successive points along its length—the engine being on the ignition point and the switch on. When the defective point is bent an indication of imperfect continuity will probably be given by the making and breaking of the current. Points where the wire is sharply moved or bent in the operation of the machine, places at which it is abraded or strained by coming into contact with moving parts of the car, and points where the wire is fastened to binding posts by screws which may be set up sufficiently hard to cut it off should be very closely inspected. If there is any part of the wire which seems especially limp when handled, a break may have occurred there. The wires leading to the timer are the only portions of the wiring which are necessarily loose and subjected to bending, and very often a wiring break will be found at this point. Solid wire breaks more easily than cabled or stranded conductor, but when the latter becomes broken the defect is more difficult of location. Small wire having very stiff, thick insulation is very likely to be broken when sharply bent.

PRIMARY SHORT CIRCUITS.

(3.) A short circuit in the primary wiring may be detected as follows: Disconnect the wires where they enter the coil primaries and leave them out of contact with anything. Then touch the switch momentarily upon each of its two battery points, and if the slightest spark appears at the switch contacts (assuming the batteries not to have been run down), there is a short circuit. If this test is not considered conclusive, any electrician with a magneto testing generator can determine in a few minutes whether there is any contact between wires which should be insulated one from the other, or any short circuit between a wire and "ground," as the engine and connected metallic mechanism is called.

"GROUNDS" IN PRIMARY.

Short circuits from a wire to ground are generally caused by the wearing away of its insulation through contact with some metallic portion of the engine or connected parts. A moving part will rapidly cut through any insulation and produce a ground. Muddy water soaking into wire having inferior insulation will produce a partial short circuit or ground to a metallic body upon which the wire rests, but such a ground may require the magneto test for its detection. Wet wires of poor insulation may also leak to one another if held closely together.

A short circuit may generally be removed by clearing all wires of contact with any metallic bodies, and by pulling each wire away from others which have hitherto been in contact with it. If the battery is kept connected during this process, and the short circuit is complete, or "dead," the exact location of the defect may be made manifest when it is disturbed by the presence of a spark. If all wires are kept dry and away from other conducting bodies, short circuits need not be apprehended.

DEFECTS IN SECONDARY CIRCUIT.

(B) Consider a defect in the secondary circuit evidenced by a failure of ignition when the coil vibrators are working regularly and energetically, and everything in the primary circuit has been inspected and approved. The defect may be

any one of the following: (1) An open circuit or short circuit in the coil secondary; (2) an open circuit or short circuit in the secondary wiring; (3) a defective plug.

(1) The secondary wires should be detached from their binding posts on the coil, and a short piece of wire should be connected by one end to one of the secondary binding screws. Its other end should be brought to within about one-half inch of the other secondary post. Assuming that the battery is all right, and the vibrator working properly, the coil should throw a perfectly continuous discharge from the end of the wire, hot enough to ignite a sheet of tissue paper almost instantly. If the discharge does not take place, and a pronounced crackling or sizzling can be heard from within the coil, or if the discharge is intermittent while the vibrator is buzzing regularly, it is likely that the coil secondary has broken down.

SPARK PLUG TESTS.

A spark plug tester may be used to advantage in this test. This device consists of a small chamber with a glass window, into which may be screwed a spark plug. Means are provided by which an air pressure may be pumped up in this chamber in order to reproduce the conditions of gaseous pressure under which the plug sparks in practice. If one of these testers is at hand, a plug which is known to be in perfect condition should be screwed into it and the pressure pumped up. The short wire above mentioned should be attached to the plug terminal and the tester placed in contact with the other secondary post. A perfectly continuous, "fat" spark of an intense brilliancy should be the result, and, if so, the coil secondary may be considered as intact. In fact, defects in first class coils very seldom develop, and one should not hastily come to the conclusion that the coil secondary is at fault, but should be sure that all other more likely causes of failure have been eliminated. Of course, if there are decided noises to be heard, indicating a discharge within the coil, or smoke is seen coming out of the coil case, trouble is evidently present. Defective coils can be successfully repaired by the manufacturers only.

SHORT CIRCUITS IN SECONDARY.

(2) A short circuit in the secondary wiring may sometimes be detected by removing its connection from the spark plug and allowing the end of the wire to remain within about half an inch of the plug terminal. When the coil is operated under these conditions, a discharge may sometimes be seen or heard leaping from the secondary wiring to some conducting portion of the car. Reinsulating the defective portion of the wire, or removing it from proximity to conducting bodies, is the natural course of procedure.

If the foregoing test yields inconclusive *results, the secondary wire may be entirely* disconnected from the coil and from the plug, and a temporary wire held free from all conducting bodies connected between the two. If the spark is satisfactorily obtained with this test wire, the regular secondary wiring may be assumed to be faulty. Sometimes, upon examination, it may be found that the secondary wire has become disconnected from the spark plug, or has become broken. The remedy for this is obvious. Water splashed upon the secondary wire will often short circuit it, unless it is very carefully insulated, and water splashed upon the external insulating surfaces of a spark plug will short circuit it until it has been dried off by the heat.

USE OF PLUG TESTER.

(3) Testing out a plug can be successfully accomplished only by the use of the spark plug tester. All attempts to determine the condition of a plug by sparking it in the open air under atmospheric pressure are perfectly futile. The gas between the points of a plug under the conditions of use is considerably compressed, and gas at this pressure offers a very great resistance to the passage of the discharge, compared with the atmosphere at its ordinary pressure; therefore the discharge, if it takes place in the cylinder, might find an easier path through a film of soot or a crack in the porcelain, than through the resistent gas between the points; while in the open air the path between the points would be far less difficult than through a carbon deposit or a minute defect in the insulation.

A failure to spark properly when tried in the tester indicates that the plug is short circuited, and a new plug should be tried. Sometimes the only fault with the plug is that its sparking points are in contact, so that no spark is possible, and, on the other hand, the points may have been placed so far apart that the voltage of the coil is insufficient to cause a discharge through the highly compressed charge. A little over 1-32 of an inch separation between the spark points may be considered correct in the absence of explicit instructions from the manufacturers.

TEMPORARY REPAIR OF PLUGS.

If a spark plug is short circuited and no spare one is at hand, and if it still remains short circuited after it has been thoroughly cleaned externally of all carbon or oil, it should be taken apart, care being exercised not to break the asbestos washer which usually packs the joint between the insulation and the outside shell. When taken apart, the internal insulating surfaces can be cleaned, and, if the porcelain is not cracked, the plug should work properly upon being reassembled. If the packing is destroyed in the process a temporary packing of string or paper may last long enough to carry the machine home. Even in case of a cracked porcelain, thick shellac forced into the break and well dried out will sometimes cause the plug to work properly, for a time at least.

A Spark Gap.

By Frank N. Blake.

Having read considerable in the automobile publications on the subject of spark gaps, and having seen so many advertised, I naturally became interested in the matter and eventually came to the point of getting one and trying it. My trial was not very satisfactory. The plug sparked both with and without the gap, and there seemed to be nothing gained by using it, so I discarded it, wondering why it was that anyone used a spark gap; the theory did not seem reasonable and no benefit appeared to attend my trials, so I decided to let well enough alone—and spark gaps, too.

Months afterward, while working on a new automobile and getting it ready for business, one of the things I did was to give both cylinders a liberal dose of graphite. It has been said that this lubricant should not be used in the cylinder of a gasoline engine because of its liability to short-circuit the spark plug, but I had long used graphite in the cylinder with no bad results whatever, and so did not hesitate to use it in the new machine, not taking into consideration the fact that differently located spark plugs and a different make of plugs might make quite a difference in the result. About the time the automobile was ready for a trial trip, a civil engineer, who was employed up country, came along and announced his willingness to have me convey him to the scene of his labors. We started within a few minutes, but very soon the engine began to misfire and act as if the spark plugs were dirty, and an examination showed that this was the case. Having no extra spark plugs, there was nothing to do but to take out the plugs, take them apart and remove the graphite which was found to have short-circuited them. Having done this, we started again, hoping to make up for the delay and get to our destination before the lapse of much more time, but before we had gone a mile the same trouble came on again, and as we were then off the line of the trolley cars, there was nothing for my passenger to do but to make the best of it and wait patiently while I cleaned the plugs again, which he did with good grace, remarking that having me take him up was his own proposition and that consequently he could not complain.

In course of time the plugs were again unscrewed, taken apart, cleaned, reassembled and put back in place, and we were once more under way. All went well for a season and then the explosions again began to be intermittent, and we turned to one side of the road and stopped. I was again about to take out the plugs and settle down to the process of cleaning them, when it occurred to me that it might be a good plan to try spark gaps on the refractory plugs, as it would be but a short job, and if successful it would be far quicker than

:dly cleaning the spark plugs. So, 'ing some plumb-bob line of my com-, I tied a piece into each terminal en tied the strings to the spark plugs, ıving tied several knots in each string ler to prevent the terminals from ig the plugs. I then tried to start gine, and as the first trial was a suc-re both climbed into the vehicle and way. Not one explosion was missed the remainder of the sixteen-mile nd it proved to my satisfaction that gaps were good things to have in ases at least. I was surprised by the te cure that the spark gaps effected ilso somewhat surprised that the did not burn off or break.

success of the spark gaps was be-question, and I soon made a set from durable material than string, though id the work no better. These spark were made of small pieces of com-d fibre about an eighth of an inch In each piece I drilled two holes half an inch apart. By one of these ce of fibre is fastened to the terminal ans of a copper eyelet (made from a bre cartridge shell); the other hole attaching to the spark plug. The iolds the terminal a definite distance the spark plug, the eyelet admits of out the spark gap whenever desired ng the terminal as usual. The dis-the spark is made to jump can be ted by means of an eccentric washer binding post of the spark plug.

ıust be admitted that better results to be obtained without the spark han with them when the spark plugs an, but when they are not clean it is, irse, different. By better results is more powerful explosions in the ers. But this is not certain, and a careful test may show that the spark lo not reduce the amount of power ed.

far as my somewhat crude tests go, rimary current consumption is the oth with and without the spark gap; so unacquainted with electrical sci-would appear that the spark would ker because of the gap, and if so the ion less powerful; but any explosion er than none at all, and the experi-herein described has convinced me spark gap is a useful friend to have call.

A Word About Crank Shafts.

By Frank W. Aurig.

crank shaft, it is almost needless to one of the most important parts of gine, be it steam or gasoline. (In this we will treat of the gasoline automo-ngine.) Its most essential require-are: First, ample strength in all its second, good metal; third, absolute and perfect straightness; fourth, per-oundness of bearing surfaces; fifth, crank pin or pins in perfect alignment with the main bearing surfaces; sixth, in a multiple throw shaft the crank pins exactly the proper distance from each other diametrically and otherwise.

It might naturally be assumed that the first requirement had been fully provided for by the designer, but experience has proved that this is not always the case. Of course, almost all crank shafts (except possibly those designed by the rankest amateurs), will be designed with sufficient strength to withstand ordinary, careful and proper usage; but the successful crank shaft is the one that has been designed with the expectation and knowledge that it will not always receive proper and careful usage. Where will we find the automobile operator (gasoline) who does not occasionally advance the spark too far, or jam the clutch in too suddenly, or commit some other species of assault and battery (accidental or otherwise) on the much abused crank shaft? Of course, we are learning rapidly, but the crank shaft must be designed to meet and overcome these adverse conditions. In this connection it may be well to suggest to designers the advisability of adding another "moment" to the calculations—that of demoralization. It may be a very difficult matter to calculate the effect upon a crank shaft of accidentally catching a sleeve or glove in the spark advance lever and advancing it to the full limit while pulling a fair load up a stiff hill, but just such instances must be provided for in designing a crank shaft. Accidents such as the breaking of a connecting rod, etc., cannot be fully provided against, as it is entirely outside the province of a crank shaft to act as a battering ram or ore crusher.

The second requirement is usually well provided for. The writer has found some crank shafts, however, that were not what they should be. One was a drop forging that had evidently been finish-forged too cold, consequently after a little usage cracks opened up at the ends of the crank pin, which, although they did not cause the breaking of the shaft, sprung it badly and made it very advisable, if not absolutely necessary, to replace it with a new one. Another one was forged out of the solid, the blacksmith making the serious error of working too close to size and doubling part of the metal over on itself without thoroughly welding it. The natural result of this can be readily conjectured.

The writer has had some experience with pieced and built-up crank shafts, but has never found any of them that were permanently satisfactory. The only bona fide, first-class crank shaft is the one that is cut out of the solid slab of steel. The ends can be forged to rough sizes, but the cranks and pins must be cut out of the solid metal, which should be a good, low-carbon, open-hearth steel.

The third requirement is sometimes fulfilled when the shaft is new; more often it is not. One of the most prolific causes of an untrue shaft is finishing it on centres on a lathe without having distance pieces (preferably solid) accurately fitted between the crank cheeks. The natural result of even a slight pressure on the ends of a shaft, whether from inaccurate adjustment of the "tail" centre or from the expansion due to heat generated by the cutting tool, being a slight springing of same, and if it be finished under these conditions, the shaft is permanently "out."

The fourth requirement is, as a rule, satisfactorily met. The exception proves the rule, however, and in this case it happened to be a shaft that was turned up in an ordinary lathe. A pair of heavy brackets had been made to fit the rough turned ends of the shaft, and the crank pin centres laid off and drilled in them. The shaft was quite heavy, and a counterweight had not been provided. The very natural result of doing the job in this way on a lathe that was not in the best condition was a decidedly oval-shaped crank pin, caused by the unbalanced weight being thrown alternately to and from the cutting tool, aided and abetted by considerable "play" in the spindle bearings.

The fifth requirement is not the easiest thing in the world to fulfill and is one of the most fruitful causes of excessive wear on the connecting rod brasses and broken connecting rods. Take, for instance, a shaft having crank pins finished as described above. If the brackets (or crank pin centres) are not perfectly rigid, well and accurately made, and firmly fastened to the ends of the crank shaft in exactly the right position, it will be impossible for the crank pin or pins to be right with the rest of the shaft. The same result will obtain with a shaft finished on the "crank pin machine" if the shaft is not accurately set on the machine before taking the finishing cut.

The sixth requirement is not at all hard to meet; it simply calls for careful and accurate workmanship.

To the above requirements may be added the necessity of providing centre bearings between each and every pair of cranks in a multiple throw shaft. There are many double throw shafts without a centre bearing now in use, but no one who has had much practical experience in this line will ever look upon them with favor.

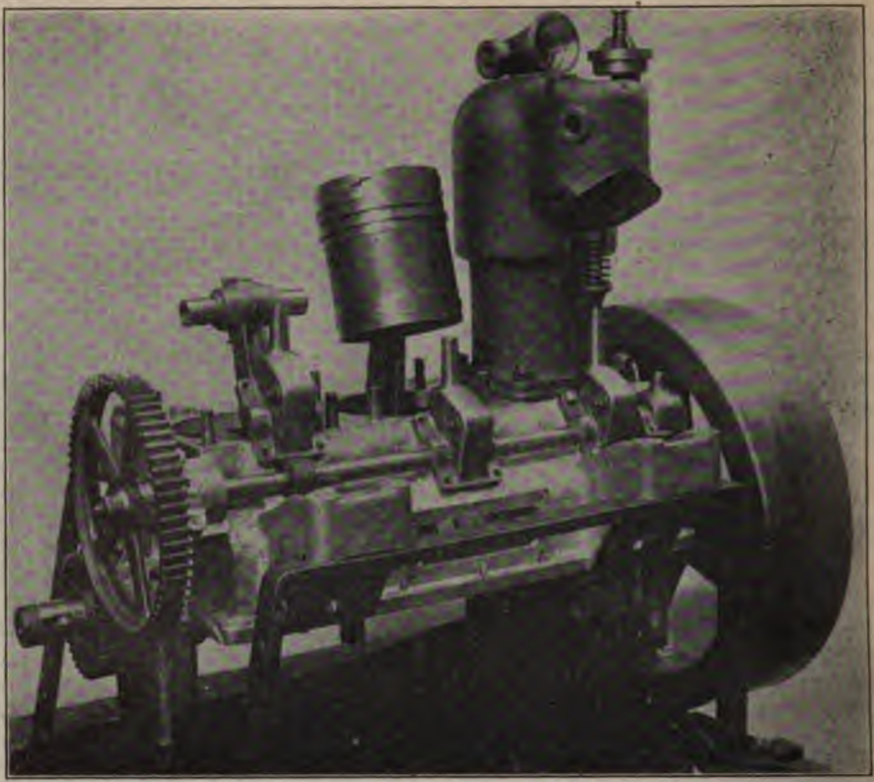
We may also add that large bearing surfaces are very desirable, the best construction favoring large and short crank pins in preference to the small and long one. the main object being to provide as stiff a shaft as consistent with moderate weight, and providing enough area of bearing surface on the pins to prevent the pressure on the connecting rod from squeezing out the film of oil, without which the bearings must inevitably overheat and "cut."

New Vehicles and Parts

The 1905 Thomas Touring Car.

The E. R. Thomas Motor Co., of Buffalo, N. Y., will build for the coming season a three-cylinder touring car which resembles in design their 1904 model, but embodies a number of improvements. A special form of side entrance tonneau body will be used, which is of very attractive form and has been made the subject of an application for a design patent. It is claimed for this car that the passengers in the rear seats are not annoyed by dust, as is the case in most other touring cars.

Under the tonneau seat, and accessible by lifting the cushions, is a space measuring 36 inches in length by 10 inches in width by 12 inches in depth inside dimensions, thus having a cubic capacity of nearly 4,800 cubic inches. In the tonneau directly back of the forward seats is a space where two suit cases may be placed, or where drawers, shelves, or lockers, etc., may be arranged as may be found most suitable. This space measures 27 inches in width, 25 inches in height, and 6 inches in depth, and is closed in by a panel door in front.



Three Cylinder 30 H. P. Thomas Motor.

A tool and tire box with two compartments is provided under the tonneau floor. The tire box is located directly underneath the floor, and measures 33½ inches in length by 31½ inches in width by 3½ inches in depth accommodating conveniently an extra 32 x 4 inch outer shoe and inner tube, repair kit and tools. Underneath the tire box is another compartment, 21½ inches in length, 12½ inches in width, and 4⅞ inches in depth, where a long pump and oiler, large tools, waste, etc., may be carried. The contents of these boxes are secured by a locker door, which is hinged to drop down out of the way when open.

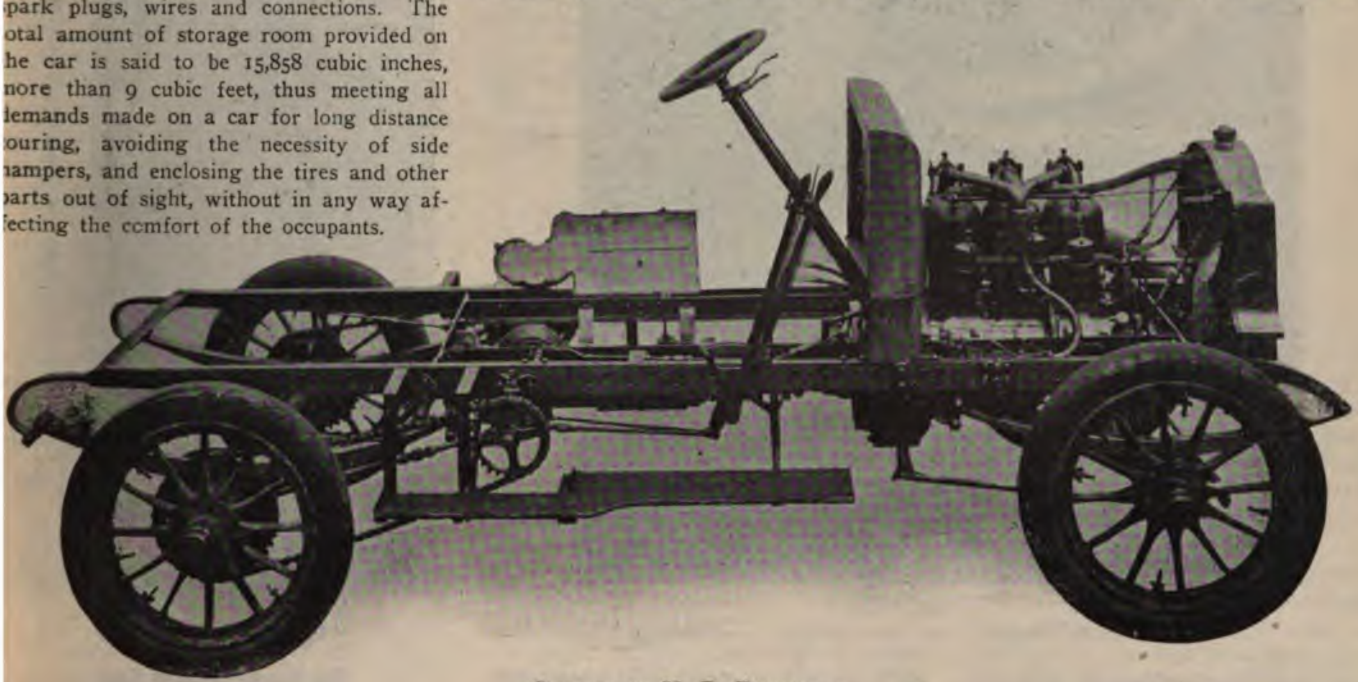
On the top of the baggage room is a rack for canes, umbrellas, light wraps, etc.

Thirty H. P. Three Cylinder Thomas Touring Car.

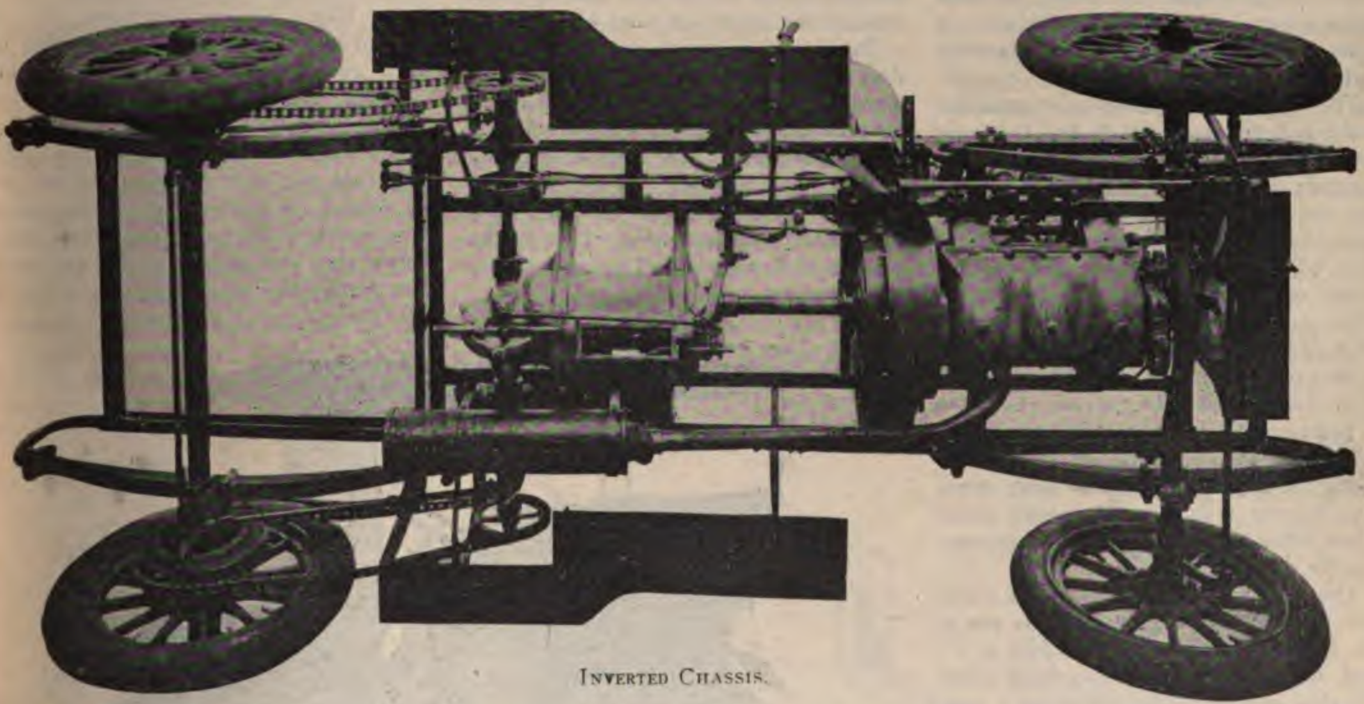
[E]ither door is provided with a pocket in [t]he upholstering, and with a flap cover over [s]ame. The dashboard is provided with [l]ockers on both sides; that on the left be[i]ng intended for tools, and equipped with [l]oops to hold oil cap, screw drivers, pliers, [w]ire cutters, wrenches, etc., while that on [t]he right is equipped with a pocket and [s]helves for spare parts, such as inlet valves, [s]park plugs, wires and connections. The [t]otal amount of storage room provided on [t]he car is said to be 15,858 cubic inches, [m]ore than 9 cubic feet, thus meeting all [d]emands made on a car for long distance [t]ouring, avoiding the necessity of side [h]ampers, and enclosing the tires and other [p]arts out of sight, without in any way af[f]ecting the comfort of the occupants.

liberal bearings, 2 inches in diameter and 4 inches long on the flywheel side, 3 11-16 inches long at the opposite side, and 2¼ inches long in the center. The wrist pin is of 2⅛ inches diameter by 1⅞ inches in length. All bearing boxes are lined with white bronze bearing metal. The valves are of the poppet type and forged from nickel steel. All parts are interchangeable,

The transmission is of the sliding pinion type, and gives three forward speeds and one reverse, the drive on the high gear being direct without any gears in mesh, thus reducing friction and noise. All gears and the inside bearings run in an oil bath, and the outside bearings are equipped with automatic chain oilers insuring ample and reliable lubrication. It is claimed that one



Chassis 30 H. P. Thomas.



Inverted Chassis.

The motor of the car is of the triple cylinder upright type, and is rated at 24 to 30 h. p.; each cylinder is cast separately, and can be replaced if damaged without affecting the others; the same applies, of course, also to the valves, pistons and other parts. The crank shaft runs in particularly

and the flywheel and crank shaft can be removed without taking the motor from the frame. The motor is lubricated on the splash system by means of automatic chain oilers, but the cylinders receive their oil from a positive sight feed lubricator secured to the dash.

supply of oil is good for 500 to 1,000 miles on the road. The motor and transmission are carried on a substantial channel steel frame which is said to have proven entirely satisfactory during the past season.

The dashboard of the car is made of rolled steel, with curved edges in the form

TRUNK ROOM, POCKETS, ETC., OF THOMAS TOURING CAR.

THOMAS TOOL LOCKER.

of a wind shield; it carries the coils, commutator, and force feed oiler, and has on either corner a locker for tools and spare parts, as has already been explained. A brass drip pan in the bottom keeps the front mat clean and neat.

The car is provided with a transmission brake and rear hub brakes, and the latter are fitted with a safety device for preventing the car backing down steep hills against the will of the operator. All the wheel and countershaft bearings are provided with adjustable roller cages, and the end thrust of the bevel gears is taken up on "high-service" steel balls running on hardened and tempered ball races. The engine is controlled by means of a spark advance lever directly under the steering wheel, and a pedal connected to the throttle valve. When the foot is taken off the throttle pedal, the engine immediately slows down. The throttle is also automatically closed when either brake is applied, thus preventing the racing of the motor.

The car has a wheel base of 98 inches and a standard tread; the wheels are of the artillery type, and are shod with 32 x 4 inch tires of standard American make. Steering is effected by means of a hand wheel through an irreversible worm and sector mechanism which is adjustable for wear.

A feature of the car is the interlocking mechanism between the clutch and the change speed gear, which prevents the gear being shifted before the clutch is disengaged, and the clutch re-engaged before the gears are fully in mesh. The transmission to the rear wheels is by double side chains, and the pull on the rear axle bearings comes between the inner and outer set of rollers.

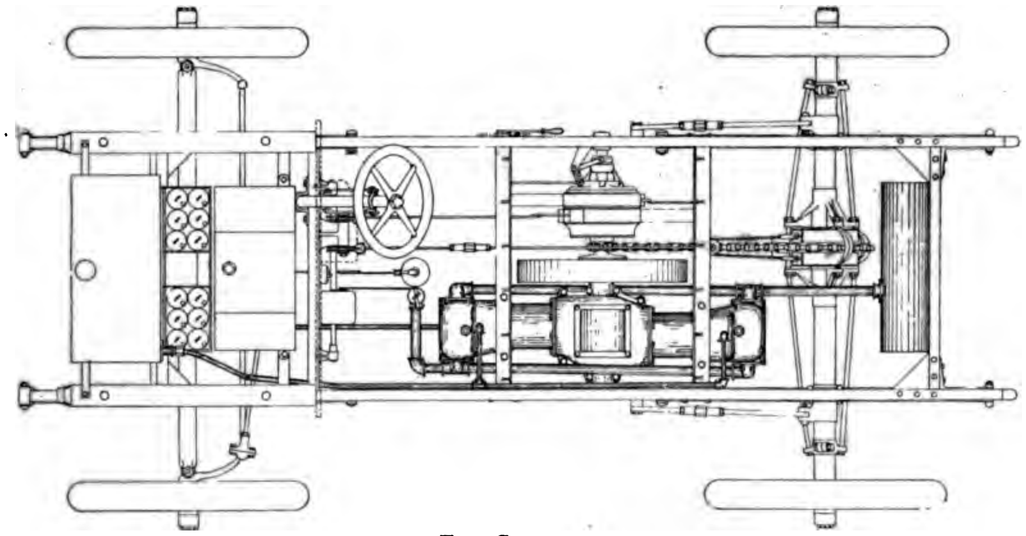
The car is equipped with an improved float feed carburetor, and a Whitlock cellular cooler. Universal joints are introduced between the motor and the transmission, and in either half of the counter shaft, thus preventing all possibility of binding in the bearings. The axles are seamless tubes with heavy forged ends. The gasoline capacity is 22 gallons, and the water capacity 23 gallons.

The Wayne Touring Car.

The Wayne Automobile Company, of Detroit, Mich., are manufacturing for the present season a tonneau body touring car with double opposed cylinder horizontal motor located in the body, and planetary change speed gear.

The engine cylinders are of five inches bore and five inches stroke, and are said to develop 16 horse-power at 900 r. p. m. The crank shaft is of the usual double throw type, and extends all the way across the frame, the part projecting from the

WAYNE 16 H. P. TOURING CAR.



The Chassis.

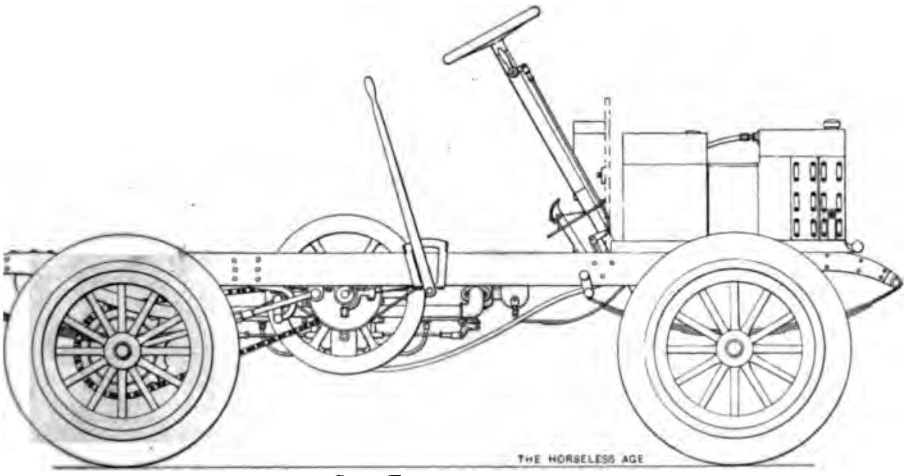
casing carrying the flywheel and speed gear. The cam shaft is located underneath the crank shaft, and is ıd, together with its driving gears, lower portion of the crank case, operating in oil. The cylin-eads and valve chambers are cast l with the cylinders. Both the in-nd exhaust valves are arranged ver-and are operated through the in-iary of bell cranks and push rods. alves, with their valve seats, are re-le from the engine as a unit, and are ıced into the valve chamber from as shown in sketch herewith. This the necessity of any opening on the the valve chamber over the valves. alve chamber is bored out from be-receive the valve seat, and the latter ı introduced and fixed in position by of a threaded ring.

carburetor is of the float feed ıg type, and is located under the foot-where it is very accessible. It sup-oth cylinders through a simple con-ı pipe. Ignition is by jump spark, ırk plugs being screwed into the top valve chambers. Current for ig-is furnished by two sets of six dry ach, and either can be used by throwing over a switch one way or the other. The ignition switch is so arranged that when a small plug is withdrawn from its socket it leaves the car inoperative, and protected against being started by unauthorized persons. The spark coil is attached to the dashboard, and is always in sight and readily accessible for adjustment of the vibrator. Lubrication of the engine is effected by means of a compression, sight feed multiple oiler.

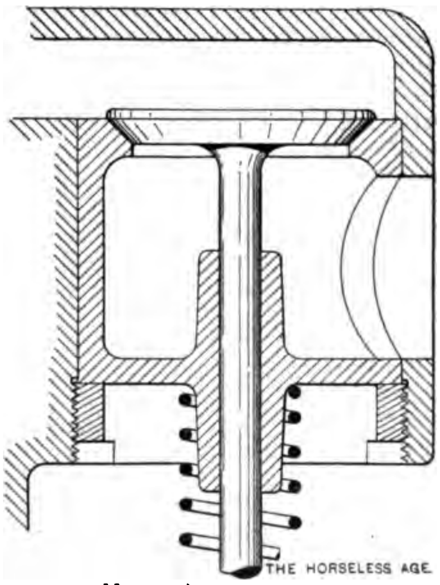
A large radiator consisting of copper coils with square flanges is located at the front of the car, closing the forward end of the bonnet. The water tank is placed directly above it. The water is circulated by means of a double gear pump, which circulates water through each of the jackets separately, in an absolutely positive manner, so that the cooling effect is alike in both cylinders. This double pump was applied after it had been found that with a single pump the rear cylinder, the pipe connection to which is much longer than that to the front cylinder, heated considerably more. The speed of the engine is controlled by varying the time of ignition and operating the throttle, the ignition and the throttle levers being arranged on the steering column.

The change speed gear is of the planetary spur pinion type, and gives two forward speeds and one reverse. On the high gear the transmission is direct from the engine shaft to the live rear axle through a roller chain. The change speed gear is operated by means of a side lever, giving two forward speeds, and a pedal for the reverse. The rear axle is of Weston-Mott construction, and carries a spur differential at its centre. The driving sprocket is secured to the centre of the different casing, and brake surfaces are formed on the differential casing on either side of the sprocket wheel. To these brake surfaces may be applied two band brakes operated by means of a pedal with ratchet lock, through an equalizing mechanism. The rear axle runs on roller bearings, and the front axle on ball bearings. The latter is of tubular construction, and fitted with drop-forged, forked axle ends, and drop-forged steering knuckles.

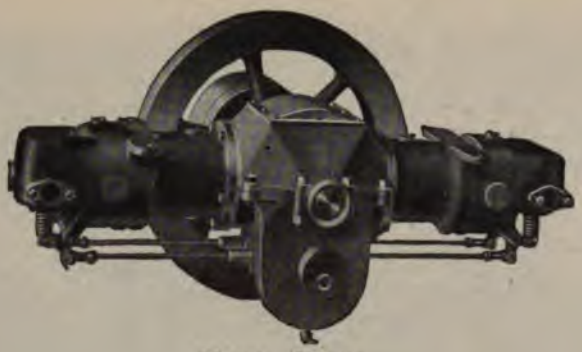
The frame of the car is constructed of pressed steel, and is reinforced at each cor-



Side Elevation.



Valve Arrangement.



WAYNE ENGINE.

ner with two fishplates hot riveted. Drop-forged spring hangers are riveted to the side members of the frame. The frame is carried on 40-inch semi-elliptic, oil tempered springs, a length quite unusual for this type of car, and which insures comfortable riding qualities. The rear axle is held in alignment with the frame, and is adjusted in position to insure proper chain tension by means of two adjustable distance rods. The wheels of the car are of the wood artillery type, 30 inches in diameter, and shod with 3½-inch detachable tires. The car has a wheel base of 80 inches, and a standard 56-inch tread. The steering is effected by means of a hand wheel through an irreversible worm and sector device. The link transmitting the steering motion from the downwardly extending steering arm on the worm sector, to the steering knuckles, has adjustable ball and socket joints.

The car is fitted with a roomy tonneau body finished in carmine, with black trimmings; it is upholstered in best buffed leather, with steel springs and hand curled hair. The front hood encloses the water tank of five gallons capacity, the gasoline tank of twelve gallons capacity, and the two dry batteries for ignition. The car is equipped with wire edged steel fenders.

The Jones Dashboard Odometer.

Jos. W. Jones, known to the trade as a manufacturer of speedometers, has recently placed a new odometer upon the market. The device is designed to be placed on the dashboard after the manner in which the speedometers are attached and is driven as are they by a flexible shaft running to a pair of gears at one of the road wheels. The driven gear, or that which is attached to the shaft, is mounted in a swivel bearing, so that the gears will separate and thereby escape injury, if, by chance, a stone or some other obstacle gets between them.

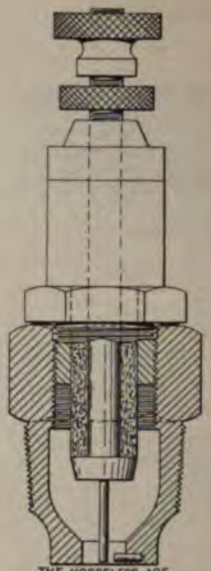
In general appearance the odometer proper resembles the speedometer. It is cylindrical in shape, being approximately three inches in diameter by two and one-half inches high. The bracket by which it is attached is so shaped that the plane of the dial is at an angle of about 45 degrees with the dashboard. A capacity of 9999.9 miles is provided, and there is a separate trip attachment which can be set back to zero at any time by means of a setting stem which, to accomplish this, is pushed in at the same time that it is turned.

The connection between the odometer and the flexible shaft is so made that it is not only water and air tight, but prevents any tampering with the ball bearing at that point. This bearing is set by the makers and, it is said, will require no further adjustment. The case containing the working parts is practically hermetically sealed, and the flexible shaft is packed for its entire length with a mixture of graphite and vaseline, so that it is self-lubricating.

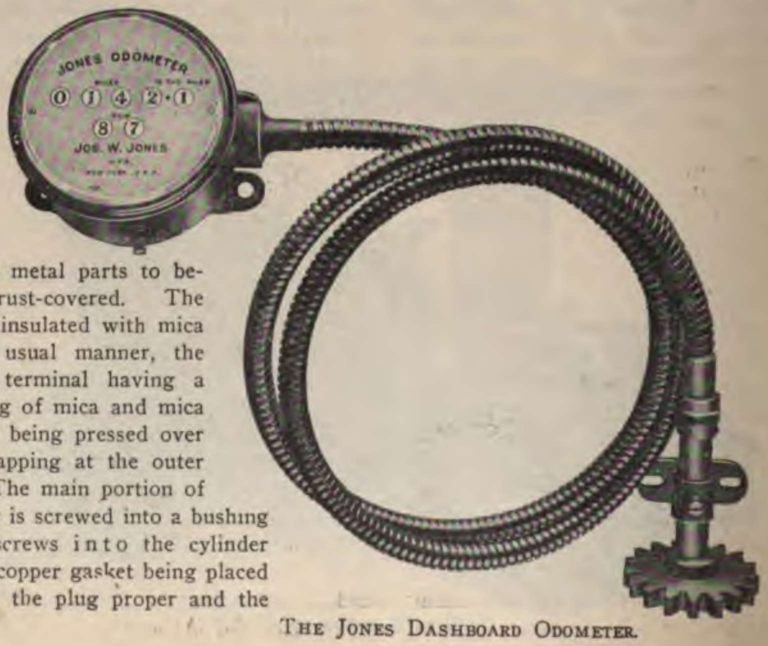
To adapt the device to various sized wheels it is only necessary to change the gear attached to the shaft for one of different diameter and number of teeth.

New Never-Skip Spark Plug.

The Post & Lester Company, of Hartford, Ct., have brought out a new form of their never-skip spark plug which embodies at least two novel features. In the first place, all the metal parts of the plug except the central terminal are made of brass, thus avoiding the liability of the plug to rust tight in the cylinder wall and of the exposed metal parts to become rust-covered. The plug is insulated with mica in the usual manner, the central terminal having a wrapping of mica and mica washers being pressed over this wrapping at the outer end. The main portion of the plug is screwed into a bushing which screws into the cylinder wall, a copper gasket being placed between the plug proper and the bushing to make a gas tight joint. The bushing has a small opening into the cylinder and has formed in it a compression chamber, the object being to secure the cleaning effect of the gases rushing into and out of the compression chamber.



NEVER SKIP.



THE JONES DASHBOARD ODOMETER.

The Auto Tire Protector.

The Empire Rubber Mfg. Co., of Trenton, N. J., are manufacturing a rubber shoe to enable the automobilist to continue his journey home on an injured outer cover. It has ten eyelets fastened through heavy duck and rubber, so that it is impossible for the lacing to pull out. It is claimed that the protector will not harden or crack from being run through mud and water and that for this reason it will last longer than either leather or rawhide sleeves. The protector can be fitted to all makes of tires and the attachment is said to require only five minutes' time and no tools

LESSONS of THE ROAD

: Hundred Miles in a Gasoline Runabout.

By W. Webster Ensey, M. D.

(Concluded.)

'e headed for Monroe, Michigan, 25 :s from Toledo, which we reached with- mishap. At Monroe we should have ied to the right at the power house and owed the traction line to the first road aing north, but instead went straight :h past the power house. The turn to right would have taken us to the road ting the Detroit River, which is not so ly as the way we took. As we pro- led, the sand increased in depth (being laces up to the shoe tops), and sudden- vhile trying to pull out of a particularly place on an upgrade, there was a ding noise in the abdominal region of machine and the car stopped. The slow- d fiber gears were stripped, and we stalled three miles from Monroe. :r a vain attempt to effect repairs, we otiated with the rural mail carrier, who l not far away, and in a short time were nging with the freight agent in Monroe hip the machine to the factory at De- . Oh, how we wished we had taken turn to the right!

rriving at Detroit, we immediately visit- he factory and provided for a complete hauling of the car and replacing of n parts, and I was instructed to call for machine in about 10 days. My uncle I enjoyed a beautiful evening ride on steamboat "Greyhound" from Detroit 'oledo.

: the specified time my wife and I called ie factory, but were given the cheering rmation that the machine was not ready would not be for a week. So, "pos- ng our souls in patience," we "took in" :ity and vicinity by electric car and boat ad of by automobile, as we had ned.

ite in the afternoon of September 5 I ved the car, with the assurance that it as good as a new one, and indeed it is well. The next afternoon (Sunday) nade our friends at the hotel good-bye took a little spin through Belle Isle : and around the boulevard, so that by ime we left Detroit on our way to To- it was 4.30 o'clock. This time we fol- d the river road, with the steamboats other craft on the Detroit River in for many miles. This road is not as y as the one we got on by mistake at roe, but as it is a dirt road it was ex- ngly rutty, with the ruts baked by the is hard as bricks. As a rule there was one wagon track, outside of which it as a rough as a Brooklyn cobblestone ment, of which I have painful memories during my hospital experience in that city. It required close inspection of the road to keep the wheels in the wheel tracks. To tell the truth, I was surprised and disgusted that the main highway of travel between two large cities like Detroit and Toledo was allowed to remain in such a disreputable condition. It does not require a very vivid magination to picture the state of that road in the spring of the year.

I observed that the engine seemed to run hot and evaporated the water too rapidly. The pump was working and I could not locate the trouble. It bothered me all the way home, and through the fall and winter, and was not brought to light till early this spring, when I took the engine apart and found the inlet pipe to the cylinder water jacket filled so solid with mud that I had to dig it out with a wire. And this after the engine was supposed to have been thoroughly overhauled at the factory. In spite of these drawbacks, however, we got to Monroe about 8 P. M. and registered at the Park Hotel.

The next day was Labor Day, and it threatened rain. In fact, it rained while breakfast was being served, but by the time the tanks of the machine were filled and the moving parts thoroughly oiled, the rain had ceased, having just laid the dust nicely. The 25 miles to Toledo were passed without accident. About half way between the two cities we met Messrs. Whitman and Hammond, who had reached that point in their tour across the continent in their Oldsmobile runabout. With a toot of the horn in greeting and a wave of the hand in adieu, we passed them. Five miles from Toledo we pulled under a carriage shed till a severe thunderstorm passed over, then a short time sufficed to bring us to our destination. One accident I forgot to record. Between Monroe and Toledo the cylinder lubricator broke off at the sight feed. I succeeded in fastening it together with wire, and at Toledo a new one was procured. It was fortunate for us that the break occurred when we could easily secure a new lubricator, for if it had happened after we left Toledo it would have occasioned considerable trouble and delay.

The next morning, Tuesday, September 8, at 9 A. M., we left Toledo for Bowling Green, distant 25 miles. As far as South Toledo (11 miles) the road is the same as that pursued on our upward trip, but there we crossed the Maumee River on the wagon bridge and turned due south. We had not gone far before the right rear tire began to leak badly. Several hours were spent in the hot sun attempting to make it airtight without much success. Shortly after again starting we encountered another severe thunder storm, but reached Bowling Green at 3 P. M. The road from Toledo was in excellent shape, and if the tires had not caused so much trouble, fast time could have been made.

We remained in Bowling Green visiting friends till the next morning. On Wednesday, at 9 A. M., we were again on the way, headed toward Findlay, 25 miles south. The road from Bowling Green to Findlay was the worst encountered on the whole trip. No attempt seems to be made to keep it in good condition, the ruts are very deep, our chain case often dragging, the one wagon track winding from side to side of the road, in perspective resembling an immense snake. If unfortunate enough to fall in behind a load of hay, an effort to pass is almost out of the question till a cross road is reached. At one place we struck a corduroy road, the sensation being similar to riding on railroad ties. At first I thought we had reached a place where the rails of an electric road had been taken up, leaving the ties in position, but soon saw my mistake.

The country is level, and yet it is not without natural beauty. Oil wells, derricks, and oil tanks thickly dot the landscape in all directions, for this is the celebrated Bowling Green-Findlay oil and gas section. In truth, the people are oil mad. No attempt at farming is made. In some cases an oil well derrick is located right at the kitchen door. Steam engines and gas engines are used for power, one engine pumping six and eight wells, the pumping levers being extended from one well to another by means of jointed rods. In many instances these moving rods cross under the road through iron pipes. The small villages passed through were Portage, Twombley, Van Buren and Stewartville.

The clock indicated 11:30 A. M. as we ran by the courthouse in Findlay. My wife suggested that the gasoline tank be replenished, but, of course, with my superior knowledge, such advice was tabooed, replying that we surely had enough gasoline to carry us to Kenton, 28 miles. The road runs through Arlington, Dunkirk and Blanchard. We also passed through another thunderstorm. Two or three miles from Kenton the engine began to miss fire, and my wife had a splendid opportunity to tell me, "I told you so." I coaxed the motor along, however, till we reached the edge of Kenton, where it absolutely refused to mote any more. Still our good star was with us, for, on inquiry, we learned that we were only two doors from the oil man of the town. We soon had four gallons of the much needed liquid. We also filled the water tank and took the time to change two of the tires. Consequently it was about 4 P. M. when Kenton disappeared in our rear.

Bellefontaine, 23 miles south, was our next objective point. Four or five miles from Kenton we met a man in a buggy with his wife and child. As we came closer, the horse began to shy. We pulled as far to the right as the road would allow, still the horse refused to advance, but began to back and stand on his haunches, nearly falling back into the buggy. I stopped the motor and went to the assistance of the man.

The horse would not be led past, so we had to unhitch him and back the buggy away, then with the horse performing various acrobatic feats I ran the automobile by. The owner of the animal was much mortified and remarked that he had met many motor cars and never had any trouble before.

We had gone but a few miles farther, when suddenly the car lost headway and the engine raced. On investigation the rod operating the bell crank of the high-speed clutch was found broken off. This part of the road was very lonely, not a house being near. While studying what to do in the matter, a man drove along and stopped to inquire if he could assist us. He proved to be a blacksmith, but his forge was seven miles away. We worked an hour with wire and finally rigged up an apparatus that threw in the clutch, but was not stiff enough to release it. When we were on the point of giving up, we discovered a stay rod on his buggy which proved to be the very thing needed. In a short time the rod was bent to the required shape, and, after reimbursing the blacksmith for his trouble, we lightheartedly proceeded on our way just as the shades of night were falling o'er the landscape. That makeshift rod is still doing duty on the machine, nearly a year after. The 15 miles to Bellefontaine were the longest 15 miles I ever covered. The acetylene headlight continued to jar out every few minutes, necessitating a stop to relight, therefore it was 8:15 P. M. before the lights of Bellefontaine were sighted. Running the machine to a livery stable, we went to the hotel.

The next morning I had a wild chase after gasoline. I had just about concluded there was none in Bellefontaine when I found some in a grocery to which I turned as a last resort. The right front tire was almost cut to pieces by this time, but we resolved to make it last till we reached home. From Bellefontaine to Urbana is 16 miles, West Liberty being situated nearly half way between. The county fair was on at Bellefontaine, and for a number of miles we met a great many horse vehicles for which we had to slacken speed, therefore our progress was slow. The roads were good, but in some places were being worked. We tarried just long enough at beautiful Urbana to fill the water tank. It is a thrifty town, the home of many retired farmers, and of much wealth, and is the county seat of Champaign county.

Leaving Urbana behind us, we pushed on toward Springfield, the county seat of Clarke County, 15 miles south. As we approached Springfield the clouds which had been gathering all the morning became more ominous, and at the edge of the city the drops began to fall. The lightning flashed and the thunder roared in a genuine old-fashioned way. It was noon when we stopped under a tree on North Limestone street, threw the waterproof cover over the machine and by invitation sought shelter for ourselves with the kind people who lived in the house. We soon found we had mutual acquaintances, and while the storm raged without we spent a very pleasant hour and a half exchanging the gossip of the day. This storm broke a drought of six weeks and was very welcome.

At 2 P. M., the rain having ceased, and being only 25 miles from Dayton, we thanked our kind friends for their hospitality, and eagerly turned our faces southwest. The streets of Springfield were heavy with mud and water, but a few miles out, in spite of the heavy downpour of rain, the road was quite free from mud, and we made better time than we anticipated. All went well until within six miles of Dayton, when on a level stretch of road the chain broke. I had just about completed the task of putting in a new link, when we heard the "chug, chug" of an automobile, and soon a touring car hove in sight from the direction whence we had come. There were two gentlemen and two ladies in the party. They stopped to ascertain if any assistance were needed. They were on their way from Cleveland to Cincinnati, but had also been detained in Springfield because of the storm, and were trying to make up lost time, hoping to reach Cincinnati before dark, for one of the lamps had been smashed by skidding into a post. As it was then 4 P. M., and the roads betwen Dayton and the Queen City of the West were probably very heavy, I expressed my doubts of their ability to make the distance (60 miles). Wishing them a safe and speedy trip, they departed on their way, and in a few minutes we followed them. At 5 P. M., tired and muddy, the machine pulled us into the stable at our home, and our long trip of 500 miles was ended.

During our jaunt we crossed 14 counties in Ohio and two in Michigan, and visited all the county seats except Napoleon, Henry county, Ohio. Twenty-five gallons of gasoline were consumed during the whole time, averaging 20 miles per gallon for all roads, good, bad and indifferent. We had no serious accidents and caused no runaways, because we determined at the beginning that no runaways should be attributed to any carelessness on our part. Of all the hundreds of people in horse vehicles which we met only two thought automobiles ought to be in a hotter climate, and many drivers, whether men or women, gave us a smile of appreciation, and some thanked us for the regard which we manifested for their road rights.

One Year with a Runabout.

By Clarence W. Moore.

Thinking that possibly my year's experience with an automobile might be instructive to at least some of your readers, I herewith relate some of the more salient features. I had been a reader of The Horseless Age about two years before I firmly made up my mind to make the venture; also of several other auto journals, but got the most useful information from The Horseless Age. I had no money to waste, and wanted to make my first investment to be a paying one if possible, as I wanted my automobile not only for pleasure, but for business as well, so I carefully scanned the columns of the papers to get an inkling as to the probable expense attached to the use of a machine of the small runabout type. I had in view several machines, including both steam and gasoline. I read many catalogues of different machines and spent several days in carefully scrutinizing machines offered at the agencies here. Two of the agencies visited were very anxious to give me a demonstration, while three others seemed to be quite indifferent. They seemed to wish or expect me to take their word for all they said their machines would do. Of course, I bought from one of the former. I decided to buy a runabout of one of the most popular makes, and after waiting one week the machine was delivered. I took one lesson of one hour's duration, and concluded I knew enough about the machine to handle it myself, although I had never had any experience with gas or gasoline engines before. In the meantime I read the book of instructions very carefully, and soon thought I "knew it all," but I had reason later to change my views on this subject.

I invited my wife to go with me on my first ride. The machine started off very nicely, but I was only about four rods from the garage when it came to a dead stop. Of course, the first thing I did was to crank it, and I cranked it several times without result. We were on a leading thoroughfare, and the usual crowd commenced to collect. My wife made some rather subdued remarks about the knowledge I did not possess about the machine, when I suddenly discovered that I had accidentally rubbed my coat against the switch on the side of the seat and thus disconnected the battery from the engine. I slipped the switch into place and away we went rejoicing.

The machine gave me no further trouble for about two weeks, when it was seized with fits of skipping, and at times I found it very difficult to start it. I found both these troubles due to using too much lubricant in the cylinder. The cylinder oil cup was said to hold enough oil for a 100-mile run, and I was using the same quantity on less than 10 miles at times. I finally got the cup to feed at the proper rate, and have had no serious trouble from this source since. After using the machine about three weeks, I found it again skipped or missed explosions, and was very hard to start, especially after it had been standing still over night or for an hour or two while on a run. I went over the battery, spark plug

:oil very carefully a number of times; › felt sure the cylinder was not getting nuch oil, as in the first case of miss . Upon opening the drip cock located ıe under side of the cylinder, I dis-ed much water had accumulated in ylinder while the machine stood still, rightly surmised the trouble was due is. The company promptly put in a gasket, charging me 50 cents for the t, but nothing for the time, which valued at $2. The new gasket did not week; in fact it leaked before I took ıachine away from the garage. They ptly put in another gasket, charging ıts and donating the time. This gasket ıp about two weeks when the old trou-eveloped—water in the cylinder. An-gasket was put in. A good job was this time, and no charges were made ever. Mobilene was used in the last ;askets. I am quite sure the real fault ith the workman who put on the gas-I say workman for the want of a bet-rm, for while there were fully ten peo-work in the repair shop there was not than one skilled man in the lot, and was the foreman. None of the other ›yees seemed to be over 20 years of age ne could not even speak English, as he ust arrived from Germany, and I don't 'e he ever saw a monkey wrench or before, yet he secured a job as an ıobile repairman, and his time was ed up to some unfortunate automobile r at the rate of 60 cents per hour.

er this the machine ran very nicely ›out a month. I used it an average of days a week over all kinds of country , principally in South Jersey and be-. Atlantic City and Philadelphia. One : started on a run of about 40 miles g a drizzling rain when I noticed the e semed to have very little power, and ionally missed explosions. After going three miles the machine refused to . I again examined the machine, ex-ıg to find either of my old enemies—water or oil—and I found nothing The batteries seemed all right, still ıld not move. The engine would start ıd make a few revolutions and finally Even though the engine did seem to t times, it had little power, for when ıld throw the clutch in it would stall :e. It was raining all this time. The plug seemed all right. A good spark d to develop when the plug was tried : open air. Finally, after working five hours with the machine with no s, I engaged the services of a hay from a neighboring farmer to take a nearby village, where there was a who styled himself a repairer of auto-:s.

ı sorry I ever saw him. He diagnosed ıse as a weak battery, so I took the to Philadelphia, 55 miles away, and set of new batteries, and after putting in the machine still refused to start. He then said the carburetor was clogged. We took it apart, and the machine still refused to mote. He then said it was due to the gasoline, which had water or kerosene oil in it. He filled up the tank with his own gasoline, with no better results. Two days had now gone by during which time the entire engine was dismantled, and still it refused to mote. He then said the trouble was in the spark plug and that the sparking points needed resetting, which he did, with the usual result. I then examined the plug very carefully while it lay on the top of the engine while in circuit with the battery and noticed a very faint spark occasionally shoot across the surface of the porcelain plug. Some time before I had been reading in the HORSELESS AGE of sooty plugs and the trouble they gave, and concluded that I had located the trouble. I took the plug apart and cleaned it thoroughly, replaced it and the engine exploded at the first revolution and worked as well as ever. I forgot to mention that I had two plugs with me; both acted the same, and worked equally well after they were properly cleaned. The repairman rendered me a bill for $5, which I paid, but it is my candid opinion that he rendered me no service.

The cyclometer showed 1,100 miles had been run when I had had the machine about three months. A short time afterward I invited a friend for a run in Fairmount Park, and while going up City Line Hill the machine suddenly stopped while the engine continued to run. A prompt application of the emergency brake brought the automobile to a standstill. My friend got out, while I allowed the machine to coast back and steered it against the side of the bank along the road, where I was able to get out and investigate the cause of trouble, and found that it was due to the shearing of four small pins in the transmission gearing, which completely threw the automobile out of commission, and I had to send for a tow to the repair shop of the agency some four miles distant. They informed me that the shearing of the pins was due to a defect in the casting at the time it was molded. The defect was a most glaring one and showed gross carelessness on the part of some one connected with the factory. After a wait of two weeks the factory supplied a new casting, for which they said there would be no charge. The time consumed in taking out the defective casting and putting in the new one amounted in dollars to the sum of $21.60, and, mind you, I was out of the use of the machine for two weeks into the bargain.

It may be well to state that I was using the machine principally on country roads, varying from clay to sand and macadam, and was acting in the capacity of traveling salesman among country stores. This was during the months of July, August and September, which were quite warm. I had been over the same route many times before with a horse, and found that I could cover twice the distance with the automobile that I could with a horse. The use of the machine enabled me to take longer trips than with a horse, and I was thus enabled to enter territory I could not conveniently reach before, thus greatly increasing business. I may also say that I made many small repairs myself while on the road. I always found country blacksmiths and plumbers very willing to aid me when in trouble, and their charges were always very moderate. Repairs of this kind never cost me more than one-tenth they would have at a regular automobile repair station. I may illustrate by giving a single instance in point.

I once accidentally twisted off the small cock shutting off the gasoline between the gasoline tank and the engine; at the time I was about six miles from a repair shop, which I called up by 'phone, and was advised by the man in charge to have the machine towed in to the shop, and, as they were very busy, they thought possibly they might be able to give me my machine in about two days, but if they had to supply a new cock it might take longer. Upon asking the probable cost for the job, was told that it could not be done for less than $8. I promptly declined a tow and consulted a local plumber, who agreed to solder the cock on if I would take out the gasoline tank myself. The job was finished in an hour and thirty minutes and the plumber's charges were 90 cents. The cock is now stronger than when the machine left the factory, and I never anticipate any trouble from this point again.

At another time I had the garage repairman put in a small roller pin on one of the exhaust cams, and was rendered a bill for $1.80. About three months later I had a country blacksmith do the same job over again and his charges were only 15 cents. In this case I took the cam lever off myself and put it on again, the entire time consumed by me was not over 30 minutes.

On one occasion I found the low-speed clutch somewhat loose, and in tightening it up I made it too tight, with the result that I sheared off two rivets that held the mechanism together, and did not discover the fact until I commenced to ascend a grade when fully 10 miles from home. I removed the clutch and took it to a nearby blacksmith who replaced the rivets for 20 cents, and I am satisfied that the work was done better than by the factory. The clutch was speedily replaced and my journey completed without further interruption.

I have run the machine over some very hilly and stony roads such as are found in the counties of Montgomery, Delaware, Chester and Bucks in Pennsylvania, over all kinds of streets found in Philadelphia, the entire distance covered being a little over 4,500 miles, and I have not had a tire puncture. My machine is equipped with detachable tires, and beyond having to pump them up occasionally I have had no

tire trouble whatever. Of course, I have always been very careful to avoid striking stones or other obstructions while running. I slow down while crossing all car tracks, and have done very little running at night, and when I did run at night it was always on roads known to me to be free from ruts and otherwise smooth. When necessity compels me to run on poor roads I invariably run slow and endeavor to pick my way and thus avoid injury to my tires.

After having run the machine about 3,500 miles, I found the chain so badly worn I decided to replace it with a new one. Some of the links showed more wear than others. I had the chain apart once, and as it was of the detachable link type, it did not take over 20 minutes to replace the broken link with a new one. The rear sprocket by this time commenced to show much wear, and I found that sometimes when I backed the machine the chain would ride up on the sprockets and become wedged in between the sprocket wheel and the casing. This occurred no matter how tight I adjusted the chain. As there was much danger to the machine by using it in this condition, I decided to have new sprockets put on both in front and rear. The cost of the sprockets was $9 and for time putting them on I paid $10.

I ran the machine every week the past winter, save two. It worked just as well during cold weather as warm. In case I had any difficulty in starting owing to the cold, after the machine had stood for several hours, I took out the spark plug and poured about half a wine glass of gasoline into the cylinder head, replaced the plug and the engine would start off afterward with very little cranking.

My car is not fitted with a float-feed type of carburetor, and as a consequence is at times harder to start on this account, and I frequently have to resort to vigorous "tickling" of the carburetor to assist the engine to start. In conclusion, I will say that though my one year's experience has not been altogether a bed of roses, still I am glad I purchased the machine and I would not part with it for twice the money I paid for it if I could not get another.

Racing Notes.

The management of the Maine State Fair, to be held at Lewiston, has decided to cancel the automobile races which were to have been a feature, owing to the inadaptability of the track for high speed.

A special silver trophy will be awarded to the operator who succeeds in breaking the world's track record for a mile at the Empire City track on September 24.

The automobilists of Houston, Tex., are endeavoring to arrange for a series of owners' races during the fall.

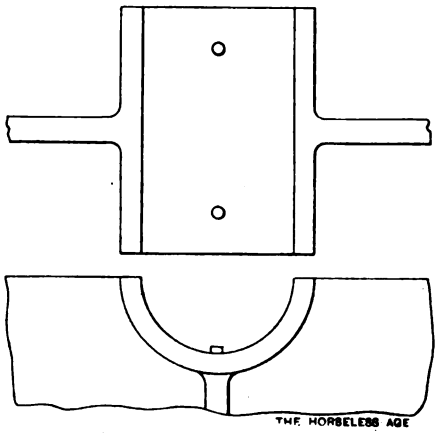
The Michelin Tire Co., of Paris, has offered prizes to those of the first five cars in the Vanderbilt Cup race which are fitted *with tires of their manufacture.*

MAINTENANCE AND REPAIRS

Rebabbiting Shaft Bearings.

By Jno. P. Conkling, M. E.

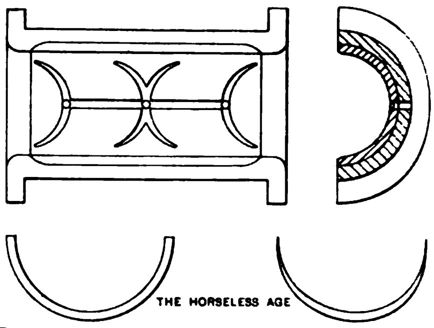
In the repair of a set of babbitt lined brass crank shaft bearings, where the only defect was that the babbitt was worn, I saw a mechanic in one of the garages add shims to the bottoms of these perfectly fitted brass boxes, to compensate for the wear of the babbitt. As there was no method of adjusting these boxes, the only proper course was to rebabbitt them. This would be less expensive, more speedily done, and produce a much better job, without destroying the brass boxes, which were originally fitted skilfully into their places at considerable expense. If properly rebabbitted they would furnish a perfectly solid bearing for the crank shaft to revolve in, as was originally the condition.



Seat for Brass Boxes.

The insertion of crescent shaped shims, semi-cylindrical in form, extending the full length of the bottom of the brass box in each of these bearings, introduced an element of uncertainty as to the solidity of the bearings, and might prove the source of considerable friction if the bearings were set up to a point where knocking was eliminated. The introduction of these shims projected each edge of each brass box above its proper surface, which was the centre line of the shaft. This necessitated filing off these edges, thus reducing the solid brass semi-circular box to a segment of a circle. When in the course of time the wear had again become sufficient to necessitate this repair, these boxes could not again be shimmed up to place, as the limit of shimming had been reached in the first instance. New brass boxes would be required, at a probable cost of twenty or twenty-five dollars, which, to my mind, was just so much money wasted, as the work of rebabbitting would require less time and be less expensive than shimming the boxes.

The process of shimming adopted by this mechanic in performing this work was the



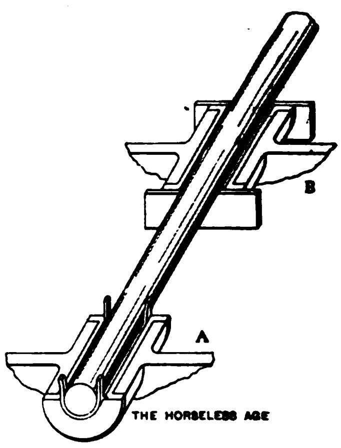
Plan and Section of Box; Shim Rough and Finished.

removal of each of the boxes from their seats, cleaning and tinning their bottom circles, cutting and bending the shims, and tinning their inner circles and sweating the shims onto the bottom circles of the boxes. After this was done the outer circle of the shims was filed to the shape of the seat of the brass boxes, thus giving the shims the cross section of a crescent. This work required care, to maintain the proper alignment of the boxes, and after it was completed, scraping had to be resorted to, as in the case of rebabbitting, to rectify the errors and obtain a perfect bearing for the shaft.

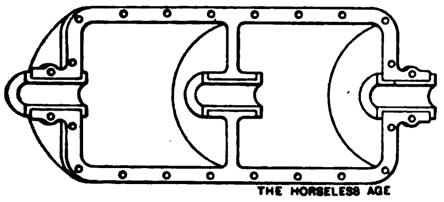
For the benefit of those who do not understand the process of rebabbitting these boxes, I will explain and illustrate the process most suitable for doing the work under ordinary conditions. There are other processes for which better results are claimed, but they would require the expenditure of too much money for special tools for each type of automobile to permit of their adoption by most repair shops, so I will not describe them.

First make sure that you obtain a supply of the same class of lining metal, or babbitt, as that originally used in the boxes. A better grade, if procurable, will do no harm; a poorer grade will prove very expensive and unsatisfactory, as these bearings are generally worked up to their limit.

Remove the brass boxes with the babbitt lining and place them, with a couple of bars

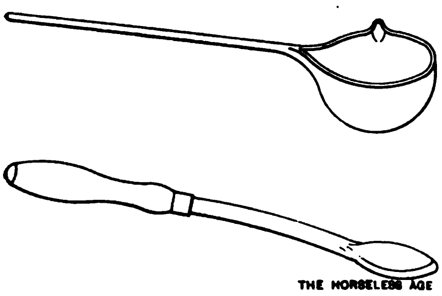


A, Showing Leather Strips in Place to Center Shaft; *B*, Showing End Plates in Place and Strips Removed, Ready for Babbitting.



Bottom Half of Crank Case with Brass Boxes.

of babbitt, in a melting ladle or pot over the fire. If the pot or ladle is not large enough to receive all the boxes at once, place therein one or more at a time, according to that receptacle's capacity. Heat the ladle, the babbitt and the boxes slowly until the babbitt is melted and flows in the ladle. When the babbitt is melted out of the boxes remove the brass boxes and let them cool off slowly. Repeat this operation until all of the brass boxes have been relieved of their babbitt lining. Never allow your babbitt to become red hot. Keep it so that it will look like fluid silver. The temperature is about right when it is just at a point which will slightly scorch a dry white pine stick placed in the molten metal and left there ten or fifteen seconds. Put the brass boxes back in their places. At each end of each box place a little strip of leather, from one-eighth to a quarter of an inch wide, and long enough to encircle the shaft. Each of these pieces should be thick enough to fill the space allotted to the babbitt metal between the brass box and the strip, and support the shaft just a trifle above its proper position. Now place the strap in position. By this means the cavity is formed into which the molten babbitt is poured. In most of these boxes the babbitt extends from end to end of the box. To extend the babbitt space, take six pieces of medium heavy cardboard or thin sheet metal, each piece equal in length to twice the diameter of the shaft, and equal in width to one-half the diameter of the shaft. About the centre of one of the long edges of these pieces cut a semi-circle equal in diameter to the shaft. Against each end of each of these boxes place one of these pieces of sheet metal, so fitted as to close up the ends of these babbitt spaces; clamp these sheet metal pieces in place, then remove the strips of leather and the cavities are ready for pouring. Before pouring, be sure your boxes and shaft are dry, otherwise the steam created by the hot metal

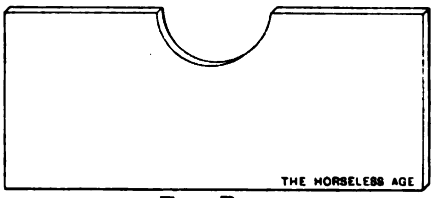


Babbitt Ladle and Scraper.

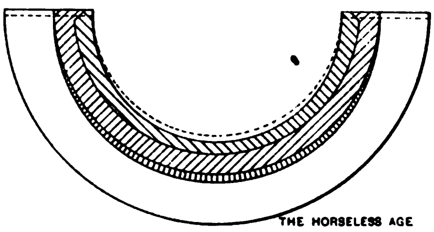
will blow the babbitt out and scatter it all over the operator, which is dangerous.

Now if your molten babbitt is at the right temperature, scrape off from its surface the oxidized portion with a stick or metal spoon, and then pour the molten babbitt into the cavities prepared for it, filling each box brimming full. The babbitt solidifies in a few seconds, when the shaft can be removed to inspect the work. If the work is imperfect, repeat it until properly done.

Many expert babbitters heat their boxes and shafts to a temperature of about 180° before pouring, which insures them against cold sheets, and generally produces a much finer bearing surface and a more perfect



End Piece.



Section of Box after Repair; Dotted Line Shows Original Outline of Babbitt.

casting. I recommend this method when putty is not used to form dams or to stop up the ends of the spaces in the boxes which are to be babbitted.

Babbitt shrinks when cooling after pouring, and needs expanding by some method to cause it to fit tightly into the recesses formed in the box for the purpose of holding the babbitt in place. Expanding also increases the density of the metal, and generally produces a better bearing surface.

To do this in small half boxes of this type, leave the box in its seat and use a swage with a convex face of practically the same form and size as the ball pene of a three-quarter round hammer. Place the ball against the babbitt, and by hammering the swage with a one-pound hammer, striking lightly each time the swage is moved, go over and indent the entire surface of the babbitt with this swage, thus expanding the metal into place and at the same time hardening its surface by compressing it.

Endeavor to perform this work uniformly, both as regards the strength of the blows delivered and the spaces between the indentations, which should apparently run one into the other, like hammered brass work.

After each of the boxes have been treated in this manner the shaft should be put back in place and the scraping process previously described should be followed until the bearings are perfectly fitted to the shaft throughout its length.

COMMUNICATIONS

The Fuel Question.

Editor Horseless Age:

The writer is and has long been deeply interested in the fuel question, and believes that insufficient attention is bestowed upon it by automobile dealers and manufacturers. It would seem to be desirable for manufacturers to determine upon the cheapest grade of fuel upon which their cars can be made to operate successfully, and to instruct their customers in accordance with such findings. On the contrary, 76° gasoline is almost always recommended in instances where any reference to fuel is made, and this grade is the most expensive commercial petroleum fuel which can be used. Not only is an extra price per gallon usually charged for this grade, in excess of that demanded for the heavier qualities, but it is actually of less calorific value than the denser distillates.

As a matter of fact, 76° gasoline is very seldom obtainable at the average garage, and the proportion of the gasoline bought for that quality which actually tests 76° must be very small. Still, almost every one calls for this quality, and is dissatisfied if it is not furnished, or at least represented to be supplied. Occasionally a gasoline dealer will offer for sale two grades—76° and 74°—and will ask his customers which they prefer. They will almost invariably call for the 76°, and an extra two cents per gallon is usually added to the price for this highly "subtle fluid." One often wonders if the two qualities are not drawn from the same barrel by the "wise" purveyor. I know of a dealer who habitually vends gasoline, benzine and naphtha from the same can, to the apparent satisfaction of a large body of customers.

An amusing exception to the almost universal craving after "76" lately came to my notice in a well known garage. A very nervous lady, accompanied by a small boy as chauffeur, drove in with an Oldsmobile and exclaimed: "Have you any 74° gasoline? My carburetor will not work on 76°." The proprietor, who is a very obliging gentleman, of course answered in the affirmative, and proceeded to fill the machine with his regular quality, which is sold for 76°, and the lady drove out in a state of perfect satisfaction. It is fortunate that carburetors are less "fussy" than their owners, and will work equally well, and with but slight adjustment, with widely different grades of fuel.

In the early days of the industry, and especially when the old surface carburetor was in use, it was quite a problem to secure an explosive mixture, and the use of the most volatile fuel was fully warranted; but now with the improved atomizing carburetors almost any of the lighter petroleum distillates will give a prompt explosion. There are certainly very few carburetors which will not work properly with any gasoline of 68° or above, and with a possibility of more powerful action in the motor, due to the greater heat value of the dense fuel.

When two qualities of gasoline are offered, the writer always buys the less expensive, so long as it is free from water and other foreign matter, as in so doing more heat energy is purchased for the same money. It would seem to be good judgment to use the densest obtainable fuel which gives a perfect mixture and normally complete combustion. By so doing, fuel cost should be reduced. In buying highly volatile gasoline of 76° grade, hydrocarbons are being purchased which exist in comparatively small proportions in the crude petroleum, and for which a high price must be obtained, owing to the small natural supply. The denser the gasoline, the more of it may be obtained by distillation from the crude oil. The limit of density of a fuel for use in a certain carburetor and engine may be fixed by the commencement of starting difficulties, which can only be avoided by a preliminary heating of the carburetor and inlet passages, either by a short running of the engine with some lighter fuel, or by the application of heat from some external source, or imperfect combustion may be evidenced by black smoke in the exhaust by a frequent sooting of the spark plugs, or a fouling of the gas passages and combustion space of the engine. The use in the formation of the mixture of heated air drawn by the carburetor from near the muffler or exhaust pipes sometimes enables heavy fuel to be completely vaporized which could not be successfully evaporated by cold air.

There has been recently placed upon the market a fuel sold under the trade name of "Energine," for which much is claimed. Specific gravity determinations upon a sample of this fluid, purchased in the open market, show it to be a hydrocarbon of considerable density as compared with ordinary gasoline, testing between 64° and 65°. This specific gravity would seem to place it beyond naphtha in point of density, and almost within the limits of the hydrocarbon known as benzine. The name Ligroin is sometimes applied to a distillate of about this specific gravity. The wholesale price of "62° naphtha," which is of about the specific gravity of "Energine," is given in the trade journals as 12c. per gallon, while 76° gasoline is quoted at 14⅛c. per gallon by the same authority. There ought to be good economy in using a hydrocarbon of this density if it is sold at a fair price, without anything being charged for the trade name. A friend of the writer's is using Energine in his car, and states that its use gives him greater power than ordinary gasoline bought as 76°, and that his spark plugs do not become foul. Improved power might be expected from the presumably greater heat value of the heavier fuel, but as he has not made any exact comparative tests of the two fluids, and relies solely upon his judgment, his results cannot be depended upon. At the price which he pays for the "Energine" a great increase in power would be required to render its use economical.

An attempt to test "Energine" in competition with 76° gasoline, in the writer's own car, by driving over a course of seventeen miles, using gasoline as the fuel, and then driving over exactly the same course, with the same load, having carefully drawn off the tank and carburetor float chamber and filled them with Energine, showed upon careful measurement a greater consumption of Energine than of gasoline. On each run the mixture was carefully adjusted before starting, but the quality of the gas during the Energine run was imperfect, as shown by the fouling of the spark plugs when that fuel was used. This fact doubtless accounts, in a measure, for the large consumption of Energine. It was found that the mixture could be regulated so that it was obviously too weak to give an explosion, and so that it was palpably too rich, as shown by a smoky exhaust, but it could not be regulated for a perfect combustion. This I attribute to the absence of any means of heating the air entering my carburetor, while the carburetor of my friend's machine possesses such an arrangement. So dense a fuel as Energine may well require slightly heated air to effect a perfectly explosive mixture.

Now this fuel question is a most important one. If we can use in our motors petroleum products of considerably greater density than at present customarily employed, purchased at their regular trade prices, uninfluenced by the glamor of proprietory names being applied to them, we can hope to effect a material saving in the fuel bill.

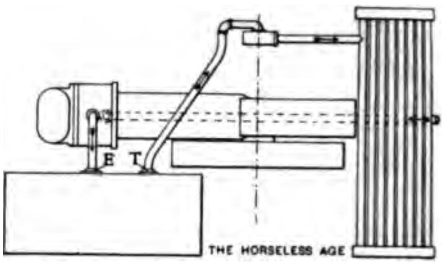
In case any of the readers of the Horseless Age are using or making experiments in the use of the heavier hydrocarbons as fuels, it is earnestly hoped that they will give their fellow autoists the benefit of their experiences.

Albert L. Clough.

Water Circulation Query.

Editor Horseless Age:

Will you kindly tell me which way the water circulates in the Oldsmobile runabout? The pump revolves in the same direction as the flywheel. I have asked here and there in repair shops, but there seems to be a difference of opinion in regard to this matter, so I thought of writing to you for the correct answer. I have been taking care of this runabout for about two years for a Buffalo physician. He maintains that the pump draws the water from the tank at T (in sketch herewith) and forces it into the cooling coils or radiator, and from there it passes on through a pipe under the cylinder into the jacket, and from the jacket into the tank at E. I contend that the opposite is the case.



Circulation System.

The tank measures 18 inches in length, 6 inches in depth and 6 inches in width; the pipe at T is about 6 inches from the top of the tank, while the pipe at E is 3 inches from the top. The diameter of the pipe is about 1 inch. It is only about five months ago that the Doctor had this tank put on, the old one having become leaky. The old tank measured 18 inches in length, 6 inches in width and 2 inches in depth, and the pipes leading into and from the jacket were located both on the same level. So far as I can judge, the old tank gave better results than the present one. I have talked to the Doctor about this matter, but he appears to want better proof than my say-so. So kindly answer the query in regard to the course of the water, from the action of the pump at least.

P. S. Williams.

[If the pump is the same as fitted by the manufacturers, and no changes have been made in the connections, it takes the water from the tank at T and forces it through the radiator and jacket back into the tank at E. The Oldsmobile runabout pump is of the centrifugal type, and in such pumps the inlet pipe is always the one which enters the pump casing at the center of one head, while the outlet pipe leaves at the circumference of the casing.—Ed.]

Terraced Coach Seats.

Belfast, Ireland, Sept. 5.

Editor Horseless Age:

The "terracing" of seats, as described in your issue of 24th instant, may be new to automobiles in the United States, but it is several years old in Ireland, in horse-drawn tourist char-à-bancs plying on the County Down coast road between Bangor and Donaghadee.

J. Brown.

ngine Has Spells of Weakness.

Horseless Age:

ı having an occasional trouble with ıring car, which seems to be due to tion of the carburetor, and having to discover the cause, would like to ıu or your readers for suggestions on

engine is a four-cylinder vertical of p., with mechanical admission valves, ıe carburetor is a "Kingston" and is l about 17 inches below the admis- alves; the intake pipes are 1½ inch. the engine is developing full power is always a hissing noise proceeding the carburetor, the sound of which is ıearly the same as that of escaping under pressure, and this noise is nuch intensified the more the throttle ned.

asionally after running several miles, or less, the hissing noise will grow r and in a few minutes entirely cease, t the same time the engine will lose wer until same is barely sufficient to the car on the high speed. This ion will continue for a period of sometimes only a few minutes, at times longer, when *suddenly* the hiss- oise will return and simultaneously ıgine will pick up and develop full again as before.

ing some of these periods of low I have examined the carburetor to it was flooded, but have failed to find Sometimes the pressing down of the would seem to hasten the return of and at other times not. Frequently turning after these experiences have the carburetor out and opened it and to find any dirt or any sign of clog- up of the passages; simply a slight it in the bottom of the float chamber. positive that the hissing noise men- l proceeds from the carburetor, and ıuery is What causes it and what s it to cease with the consequent lack wer and then its sudden return with- nything being done in most instances ange it? Will thank you or your rs for any suggestion on this matter. written the makers of the carburetor, ıey have failed to reply to my letter.

W. E.

ıe "hissing noise" is probably natural ur carburetor, being due to the action e edges of the air inlet into the car- ɔr and the powerful suction of the e. If it is so strong as to be objec- ɔle, we would recommend to put a metal bell over the inlet to the car- ɔr, the mouth of the bell being cov- by a wire screen. It would be advan- us to put an elbow between the car- or air inlet and the bell, so that the may be placed with its centre line s the car. The gauze covered opening e bell may be five or six times as large ea as the inlet opening, so the speed ıe air over the edges will be much smaller and the noise consequently reduced.

The occasional spells of weakness which you describe would appear to be due to the suction passage becoming choked up in some manner during operation and automatically cleared again. A similar trouble was sometimes experienced in earlier years by operators using a length of rubber hose in the inlet pipe. The gasoline vapor would attack the rubber, large patches would become partially detached on the inner surface of the hose and would be drawn right into the opening by the suction, choking the inlet completely. While the engine was stopped the patch would sometimes flap back, owing to the elasticity of the rubber and when the engine was started again it would run as usual for a while.

We would suggest that you thoroughly investigate the inlet passage, from the air inlet to the carburetor to the inlet valves, for anything that may possibly stop up the inlet passage, either through the vibration of the car or the suction in the inlet passage.—Ed.]

Engine Position.

Editor Horseless Age:

A comparison of the bst installments of vertical and horizontal gasoline engines in automobiles, it seems to us, may be interesting and perhaps useful at this time. We believe a horizontal opposed cylinder motor, placed crosswise of the car and below its side beams to have the following advantages over any vertical motor emplacement. What have your engineering friends to say on this matter? We believe in a cross frame position and the horizontal type for the following reasons:

1. The motor can be placed under the frame and crosswise thereof. This renders it (a) more accessible than any vertical engine; (b) strengthens the chassis; (c) gives a lower centre of gravity; (d) uses no room of value to owner; (e) the car is not heated; (f) all engine odors pass off under the car and are not noted.

2. It occupies only one-half as much longitudinal room, consequently the car may be shortened.

3. It is lighter, for each set of side cylinders uses only one-half of a crank and crank case.

4. It is stronger, for the crank has *only half the length* and the foundation case is only half as long.

5. The shocks are opposite and exactly balance and offset each other, hence the motor runs with less vibration.

6. The vertical cylinder cannot be properly lubricated unless the oil enters on at least opposite sides, for gravity carries the oil down and not around the piston. The horizontal cylinder is in an ideal position to receive and distribute oil to the piston, for the lubricating oil runs around it by gravity. We are not unmindful of "splash" crank box oiling, but this is generally discarded, as it is a most fruitful cause of sooting plugs and coating the piston and cylinder with carbon deposits. It is easy with a ram oiler to give the horizontal cylinders just the right quantity of cylinder oil. There is no sooting of any cylinder properly lubricated with good oil, unless it be connected with an adjustable carburetor, which is seldom set right by the average autoist.

Thos L. Sturtevant.

Explosion Engine Query.

Editor Horseless Age:

Being a constant reader of your paper, I beg to ask you a few questions relative to four cycle motors:

1. At what point should ignition take place—when the compression stroke is completed, just before, or a little after? 2. I changed the ignition cam on my engine, after changing the exhaust valve cam, and can't seem to get the engine to run more than a minute or so, and when I advance the spark the engine stops.

I believe the ignition cam is set wrong.

By answering the above through the columns of your next isue, you will greatly oblige

George Wells.

[The explosion should take place practically at the dead center when the engine runs slow, say at 500 revolutions per minute, and nearly one-quarter stroke before the dead center when the engine runs at high speed, 1,500 to 2,000 r. p. m. Set your cam so that you can retard the spark slightly behind the dead center and as far ahead as the range of motion of the interrupter will allow. It is more likely that the trouble is with the exhaust cam setting. Make sure that the exhaust valve begins to lift about ⅜ inch before the engine reaches the dead center and that it closes again at the next dead center. Even if it closes at the right time when turning the engine over by hand, it is not a positive proof that it closes correctly when running at high speed, as the spring may be too weak to cause the valve to follow the outline of the cam at high speeds. To test this, compress the exhaust valve spring from above with a screwdriver while the engine is in operation and observe whether there is any effect on the speed. If the engine speeds up it shows that the spring is not strong enough. First, however, make sure that the valve operates correctly when engine is turned by hand.—Ed.]

New Speed Indicator.

The Webb Co., of Newark, N. J., corner of Columbia and Green streets, with offices in the Park Row building, New York City, have entered the automobile supply business. They are handling a new speed indicator, the invention of Hartwell W. Webb.

BEGINNER'S PAGE

Tool Box Equipment of a Car.

The tools which the motorist must carry in his car may be divided into two classes, viz., those which are used for ordinary adjustments and those which are used for extraordinary repairs. By "ordinary adjustments" is meant the tightening of the various screws and nuts, as they work loose through the jar of driving; taking up wear in bearings, etc. The motorist sometimes also finds it necessary to repair on the road some break which may either seriously interfere with the successful operation of the car or prevent its running at all, and to resort to "make-shift" measures in order to reach his destination. When this occurs, he who is the better equipped with carefully selected tools and repair supplies is, of course, the better able to cope with the situation.

With the idea of reducing the number of individual implements in the repair outfit, a considerable number of so-called combination tools have been put upon the market. These usually take the form of a combined screw driver and bicycle wrench, a combined pipe and nut wrench, etc. This type of tool is usually not satisfactory, being, for instance, neither a very good screw driver nor a very good wrench, and is likely to become useless prematurely through the breaking or wearing away of some vital part.

It is also true that it is very often necessary to use two tools at the same time, as, for instance, when a lock nut is run down a set screw. In this case a combination tool is useless, and the necessity for carrying both screw driver and monkey wrench for such cases as this makes it superfluous. It is, however, only fair to state that there are certain combination tools which, for the lighter kinds of work, are exceedingly handy. The awl with a hollow handle for holding a number of variously shaped points which can be fitted to it is one of these. Another is the screw driver with a number of interchangeable blades. If strongly made, it may obviate the necessity of carrying two or more of these implements to fit the different sized screws. There are, too, wrenches which serve equally well for tightening nuts as for holding round rods or pipe, but, as practice has shown, there is nothing better suited to accomplish the first of these than a monkey wrench with parallel jaws, and no better pipe wrench than one specially made for the purpose. A tool which, with the same jaws, will either hold a pipe or turn a nut, provided it does the first satisfactorily, is more likely to cut off the corners of a nut, thereby injuring it to a degree, than is a wrench with smooth parallel jaws.

To the first of the two classes of tools herein discussed (those for ordinary adjustments) belong the monkey wrench, screw driver, special spanners, etc., and possibly the plyers.

Certain foreign manufacturers equip their cars with telescoping socket wrenches. These are nothing but short lengths of steel tubes formed on each end to fit the various nuts and one within another. Two or three holes are drilled through each of these tubes, into which is fitted a round rod which provides the necessary leverage for handling the nuts. This rod when not in use is slipped within the inside tube. This form of wrench has been found very useful; the objection that it requires the picking up of another tool if a different sized nut is to be worked on being more than offset by its many advantages over the monkey wrench in any case where its use is possible. The socket wrench need not be removed from the nut at the end of each stroke, and as it fits on all sides of the nut, there is no danger of injuring the corners. It is especially useful in removing spark plugs from an engine, as they are held by it when out and can be cleaned and adjusted the more readily.

A development of this type of wrench is that which is supplied with a universal joint and a set of interchangeable sockets. With this attachment the complete outfit is not so compact, but its use is made possible in many places in which the straight tube could not be worked. It can also be fitted with an extension member which will possibly enable the user to work in a less cramped position, and secure a larger sweep for the lever rod by bringing it clear of obstructions.

There are a number of monkey wrenches on the market which vary much in quality and price It is usually desirable to carry two, one a well-made bicycle wrench and the other of similar design but larger. With these it is ordinarily possible to get at and handle successfully any screw or nut on the car.

Something has already been said on the subject of screw drivers. To make the labor of turning screws as light as possible, and to prevent injury to the screw and to the blade of the driver, it is necessary that the blade fit to the bottom of the slot and tightly against its edges. The sides of the blade should be nearly parallel, as the more they taper the greater is the amount of endwise pressure necessary to keep the driver in the slot, and the greater the likelihood of doing damage to the screw. A good-sized handle is a necessity, as the amount of leverage obtainable is dependent upon its diameter.

What special spanners should be carried depends upon the design of the car. The makers usually supply them as part of the regular equipment.

For plyers, the automobilist will do well to select those which provide for a parallel jaw movement and are also fitted with a wire cutting attachment. This type is superior to the ordinary pivoted variety in many ways. They can be used for turning small nuts without danger of wearing off the corners, and because of the fact that they grip for the entire length of the jaws, it is possible to hold more tightly with them and there is little likelihood of slipping off and pinching fingers.

We come now to the tools for extraordinary repairs. They consist mainly of the more common bench tools of the machinist—the hammer, cold chisel, drifts, files, pipe wrench, etc.

The hammer should be of the machinist's type and of medium weight. Two cold chisels will usually be enough, one for light and the other for heavy work. It pays to have good chisels and to keep them sharp. Those which can be had at a relatively small price are ordinarily made from inferior steel improperly hardened, and if they do not break easily they will most likely dent on a bit of metal which a good chisel would cut through. Care should be taken that hardened steel pieces be not attacked with a chisel. If there is any doubt as to whether the piece is "hard" or "soft" it is best to test it first with a file.

A set of drifts so selected that any taper pin or key on the car can be driven out should find a place on every car. It is a common sight to see motorists endeavor to drive out a pin with a wire nail or a bit of wire. If a pin is fitted properly, it will be practically impossible to do this. Before it starts, the nail or wire will bend, and the chances are that metal around the hole will be considerably dented. With a drift, a vigorous blow can be delivered without danger of its bending, and the pin will therefore start more readily.

As it is not to be expected that road repairs will be "finished jobs," as the machinist would say, a great variety of files is not necessary. Three is usually a sufficient number—one a coarse bastard with which a considerable amount of material can be removed in a short time; another a finer "float," which can be used for finishing off the roughness left by its larger companion, and for lighter work; the third, a fine finger nail file, to be used for dressing electrical contact points. There are on the market small strips of emery paper designed for use on the finger nails. They are light, compact and inexpensive, and are very satisfactory for cleaning platinum points.

For handling small rods and pipe nothing is more satisfactory than a small Stilson wrench, although there are several other wrenches on the market which may serve the purpose equally well. A pair of gas pipe plyers, so-called, will also meet the requirements and has the advantage of quick adjustment. They are also useful in turning small nuts, the corners of which have become worn off. There is also on the market a flat wrench with an adjustable

saw edge jaw which can in many instances be used to advantage.

Besides the extra parts—bolts, nuts, screws, etc.—which should be carried, the kind and number depending upon the construction of the car, there are a few general supplies which should be included in the outfit. It is surprising to find how many purposes a piece of bare copper wire of about No. 12 gauge will serve. It is so nearly a "cure all" in minor cases of trouble that the motorist who has had experience in its use considers it a necessity. A considerable amount can be rolled into a small coil, and for this reason a length of 12 feet or so should be always on the car.

Rubber tape is also a necessity. Its tensile strength and adhesive qualities make possible its advantageous use on many occasions. Two pieces of soft sheet brass should also be included—one of about 1/8 inch thickness and the other not over 1/64 inch. Brass works easily, and can be bent to almost any desired shape. From the thicker piece can be cut, by means of a hammer and cold chisel, locking nuts, washers and irregular pieces which may be used to hold broken parts together temporarily.

In conclusion it may be said that in selecting tools for an automobile equipment, the purchaser should be governed more by quality than by price. A well-made, substantial tool more than pays for itself in length of life, the results accomplished and the satisfaction derived from its use.

Trade Literature Received

Boston Gear Works, Boston, Mass.—Treatise on intermittent gears.

M. E. Moore & Son Co., Westfield, Mass.—Circular of Moore's automatic valve acetylene generators.

Wray Pump & Register Co., Rochester, N. Y.—Catalogue of the Wray double acting compound air pumps, pressure registers and hose couplings for automobile tires.

Electric Storage Battery Co., Philadelphia, Pa.—Circular of "Exide" sparking batteries.

King & Zimmerman, 508 East Water street, Syracuse, N. Y.—Circular of an "electric detector" for testing spark systems.

Pope Manufacturing Co. (Westfield, Mass., Factory).—"Multiple Metal Parts," a pamphlet containing testimonials from users of their products.

Edmund & Jones, Detroit, Mich.—Catalogue of automobile lamps, both oil and acetylene.

Packard Motor Car Co., Detroit, Mich.—Illustrated booklet containing data in connection with the recent 1,000-mile non-stop run made by one of their cars.

Electric Storage Battery Co., Philadelphia.—Pamphlet in regard to sparking batteries.

OUR FOREIGN EXCHANGES

German Competition for Colonial Motor Wagons.

A society in Berlin having for its object the commercial development of the German colonies, has instituted a competition for motor wagons for use in the Tropics. The competition is limited to German manufacturers, and is therefore of no direct business interest here, but, nevertheless, the impetus given to the commercial vehicle movement in general by this competition will be watched with much interest in this country. It may be recalled in this connection that about a decade ago the older Daimler was approached by the authorities with respect to the possibility of employing gasoline motor wagons in opening up these colonies, but his reply was rather discouraging—to the effect that the total load capacity of the wagons would be required to carry water for cooling the motor, and that consequently there could be no question of such an application of gasoline-motor propelled wagons. At present, it seems, absolutely no water is required for operating gasoline vehicles in tropical countries—a good criterion of the progress which has been made in automobile construction during the past decade.

The reasons which prompted the organizers, and some of the conditions of the contest, as given in a circular issued by the Colonial Exploitation Committee, are as follows:

Owing to the inadequate means of transportation, all commercial traffic in the German colonies in the tropical regions of Africa is limited to the coast districts. All transportation to the interior is now carried on the heads of niggers, who are thereby lost for the agricultural development of the colonies. The use of draught animals between the coast and the Hinterland is impracticable, owing to the prevalence of diseases, such as Texas fever, and only steam power and explosion motor power are available as propelling power for vehicles. For the opening up of German East Africa, Togo and Kameroon, with an aggregate area of 600,000 square miles, only 50 miles of railroad have so far been put into operation, but appropriations for 225 miles more have this year been made by Reichstag. The further commercial development of these colonies seems to demand the installation of a well-organized automobile service, especially for carrying freight to the railroad stations. The export of large quantities of raw materials such as cotton and other fibrous materials, palm oil, crude rubber, timber, minerals, coffee and cocoa, depends largely upon cheap transportation facilities from the interior to the coast. It is impossible to compete in the world's markets when the only means of transport to the coast trading ports is on the heads of niggers, at 40 cents per ton-mile, as compared with an average of 12 cents per ton-mile by railroad, or with motor wagon transportation.

The importance of at least partial national independence in the matter of the supply of necessary raw materials and products, and the opportunities for creating markets for domestic goods in the colonies, which would naturally result from better means of communication in the colonies, have led the Colonial Exploitation Committee to decide to award the gold medal for colonial-machine construction for a German automobile for the tropics. This vehicle must meet the following requirements:

Weight of wagon, up to 2 metric tons; load capacity, 2 metric tons; speed, 3.2, 5 and 7.5 miles per hour, according to road conditions; must climb hills up to 12.5 per cent.; must operate reliably on roads known in Germany as ordinary country roads; the motor must not be affected by the hot climate; simple to operate and keep in order.

The cost of manufacture, all repairs during the trial period, and the expense of drivers must be met by the manufacturer, while the committee agrees to bear the expense of shipping the wagon from Hamburg to East Africa or Togo, and, if necessary, back. The trial of the wagons occurs in the colony, by a commission appointed by the committee and presided over by the governor of the colony. Entries for the competition close on October 1, with the Colonial-Wirtschaftliche Komitee 40, Unter den Linden, Berlin.

Automobile Laboratory for Austria.

At a recent conference between Herr Wilhelm Exner and several representatives of the Austrian Automobile Club, the proposed erection of an institute for the promotion of the automobile movement in Austria was discussed, and the detail of its organization considered. The institute is to be established on a broader basis than the testing laboratory of the Automobile Club of France, which latter serves simply for testing automobile motors. The proposed institution would be equipped with all the apparatus and appliances necessary not only for practical tests on automobile motors and investigation of their dynamic processes, but also for tests of other automobile component parts, such as tires, brakes, chains, driving gears, etc.

For purposes of investigation and demonstrations, a certain equipment of automobile parts is to be purchased, which may eventually be completed to form a collection of samples of automobile design. In addition to the objects mentioned, it is also intended to institute different courses of instruction for mechanics and locksmiths,

for special training in all the different operations necessary in handling automobiles, as well as a training course for automobile drivers. The project is to be carried through and directed by a committee of specialists, on which the automobile industry and automobilists will be duly represented. A further conference was set for September, at which time it was expected the plans would mature sufficiently to admit of their partial realization at least before the end of the present year.

Transmission Gear Efficiency Tests.

Comparative tests of transmission gear efficiency are to be made in the mechanical testing laboratory of the National Conservatory of Arts and Trades, 292 Rue St. Martin, Paris. The object of these tests is to determine which types of transmission gears deliver the greatest percentage of power of the motor to the wheel rims, and the tests ought to give a good idea of the differences in efficiency between parallel bearings and ball bearings, bevel gears and direct transmission; and also furnish some interesting data on the efficiency of belt transmission and electric transmission, as employed in some of the numerous gasoline-electric combination systems.

Competitors are required to present at the testing apparatus their chassis, *i. e.*, vehicles without body, and must furnish two machinists, who are responsible for the vehicle while it is being tested before them by the staff of the laboratory. These machinists will be called upon at the proper time to attend the tests for two consecutive days. After the first tests they must remove the motor from the frame, in order that measurements may be taken on same and power tests be made. Each entrant must furnish a frame of either metal or wood to which the motor may be fixed for the brake test. He must also connect the motor to the dynamometer by means of a flanged coupling prepared in advance in accordance with the instructions furnished at the time of entering.

The frame must be provided with several planks, solidly fixed to it, for carrying ballast equal to the weight of a closed body in running order, with occupants and supplies. The wheels must be shod with Michelin tires of normal smooth section (120 millimeter size, if possible).

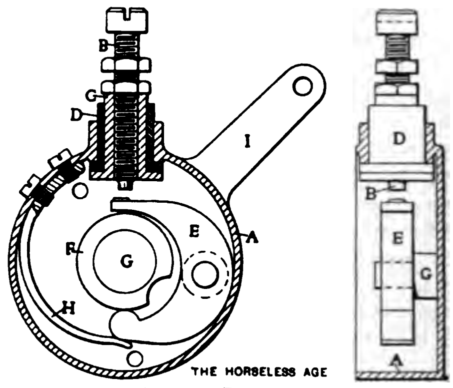
All requests for information may be addressed to M. G. Bourcier-Saint-Chaffray, 17 Avenue Bugeaud, Paris, the organizer of these tests. The entry fee is 150 francs per vehicle prior to September 15, and 200 francs after that date, and must accompany the entry order. The laboratory will be open only to members of the jury, manufacturers, and to persons who have requested permission to enter and are in possession of a written authorization. For each test the laboratory of the National *Conservatory of Arts and Trades will issue* a report stating (1) the mechanical efficiency of the transmission; (2) the power shown in the motor brake trials. The best results will be published.

Multi-Note Signal Horn.

A musical horn for automobiles has recently been invented by an English genius. A pump of a size proportionate to the number of horn-notes furnished is belt-driven from the outer part of the hub of the nearside back wheel. The atmosphere pumped is stored in a rubber container, which is placed in a neat box that can be kept beneath one or other of the seats or in whatever position is most convenient, according to the nature of the body of the car. When the air is released by depressing buttons, such as are used for electric house bells, and attached to the direction pillar, a horn is sounded, each one being controlled by a separate button. The horns lie flat, and may be placed anywhere about the car, provided they give forth sound in a forward direction. Each horn is arranged for tuning, which is done by adjusting a small sliding rod lying flat against the side of the trumpet. Moreover, the reeds are protected from dust by a special device, hence there is no likelihood of what is euphuistically termed hoarseness. Of course, the ordinary horn can be operated by means of the same device. It is not necessary to lift the hand from the steering wheel as when sounding the ordinary type of horn, which is a considerable convenience, as is the fact that an indefinitely sustained note can be produced when desired. When the new "tallyho!" horns are used it is very notable that the road clears vastly more rapidly ahead, while the really musical sounds cause those warned to look about them with pleasant glances in place of the usual displeased expression that is more or less the inevitable result of having received a shock to the nervous system. With a set of four horns the driver can give nearly all the coaching calls; with an octave at disposal the musical may manage any melody they care to call to mind. Doubtless the complete equipment of eight notes will be much in request for advertising purposes, while the modest quartet of horns is such an immense improvement on the usual method of giving warnings that it is likely to become all the vogue, with results no less melodious than excellent.

Circuit Breaker for Bicycle Motor.

The cut herewith shows a very compact form of ignition circuit breaker used on a European make of motor bicycle. Referring to the cut, G is the cam shaft to which is secured a collar F with a depression at one part of its circumference. Arranged concentric with the cam shaft is a metal casing A with a radial arm I by means of which it may be rocked slightly about its support in either direction. The casing is formed with a boss at one point of its circumference into which is forced a bushing D of insulating material. Through this bushing is passed a metal sleeve C internally threaded to receive the contact screw B. Pivoted to the back wall of the casing A is sort of lever E, carrying the movable contact point adapted to make electrical connection with the point of the screw B. The lever E is in the form of a crescent surrounding the collar F, and the contact point carried by it is normally held away from the contact screw B by the collar F. When the depression in the collar F comes around to the end of the lower arm of the lever, a spring H, secured to the outer wall of the casing A, causes lever E to move around its pivot and establish contact with the contact screw B, this contact being broken a moment later by the depression in collar F moving by the end of the rocking lever E. The device can readily be adjusted for any wear that may occur at the contact point, but is to a certain extent self-regulating. Its greatest advantage is undoubtedly its compactness.



CIRCUIT BREAKER.

Motor Cars and Motor Cycles in England.

There are now in the United Kingdom 20,076 motor cars and 22,916 motor cycles. The trade in these vehicles is certain to grow in leaps and bounds during the next few years. The English roads are perfect, and while the money market is doubtless tight, there is, nevertheless, an immense amount of wealth in reserve among the people, and they will not hesitate to spend it for wants and luxuries even though they hesitate to trust it in commercial enterprises.

Several of the large American manufacturers have established agencies in London, and I am informed by the principals that business is good. Nevertheless, the United States is not securing as much of this trade as it might and should. Germany has its representatives traveling all through the kingdom, and English firms are pushing their business with systematic and untiring enterprise. American firms would do well to stimulate their London representatives to greater activity in the provinces.—Jos. G. Stephens, Consul, Plymouth, England.

French Live Axle Design.

We show herewith a sectional view of the live rear axle of the Morisse four-cylinder car, reproduced from *L'Automobile*. It will be seen that the design differs materially from current American practice. Plain bearings are used exclusively, and no means of adjustment seem to be provided for either the bearings or the drive gears. The axle fittings, instead of being brazed on, are screwed and clamped on. The outer axle bearings are provided with ring self-oilers. The driving pinion shaft is supported in bearings on both sides of the pinion.

An international challenge race for motor bicycles will be held in France next month. The Motor Cycle Club of France has received challenges from the corresponding clubs of Germany, Belgium, Italy and England. Each team will comprise three riders.

The general council of the Department of Marne, France, has unanimously passed a resolution urging the Minister of War to approve a project to build an automobile race track (autodrome) on the military camp at Chalons, the project being due to the Mayor of Suippes. The track is to be 20 miles in length and 20 feet wide.

In order to remove from lamp glasses the unsightly grease spots frequently met with and to restore the handsome appearance of polished glass, pour some slightly heated solution of potash on the glass, moisten the whole surface with it and rub the stains with a fine linen rag; rinse the glass with clean water and carefully dry it off with a fine, soft cloth.

The French Minister of Commerce has charged M. Frederic Manaut, general secretary of the French Section at the 1906 Milan Exposition, with making an inquiry with the object of devising ways and means for increasing the markets for French automobiles (gasoline, alcohol, electric) in the Kingdom of Italy, and particularly in the cities of Turin, Milan, Florence, Genoa, Rome, Naples and Palermo.

An increase has recently been made in the tariff charges on automobiles imported into Russia. The increase is 10 per cent. on motor bicycles and 20 per cent. on automobiles. The trade in foreign-built automobiles in Russia is largely controlled by the French, and as the increased tariff duty is likely to adversely affect the business, a report on the matter has been made to the French Minister of Commerce by Max Richard, president of the French Automobile Manufacturers' Association.

According to the *Globe*, Colonel Renard, of the French Aërostatic Department, has invented a new boiler, which he expects to help the motor balloon. It heats very quickly, is practically smokeless, uses liquid fuel and gives a very high pressure of dry steam for its weight. The French Government proposes to try the boiler in the navy. It is essential that the new boiler will increase the radius of action of a torpedo-boat from 175 to 680 miles and that of a warship from 8,000 to 24,000 miles.

The Italian Minister of Public Works, accompanied by several of his deputies, made a thorough investigation recently of the operation of the automobile line between Rome and Viterbo (50 miles). He personally took a trip in one of the wagons of the service from the Transtevero station to Conpronica. It is understood that if the results of these investigations are satisfactory the service is to be extended to several routes where the traffic is limited and the means of communication insufficient.

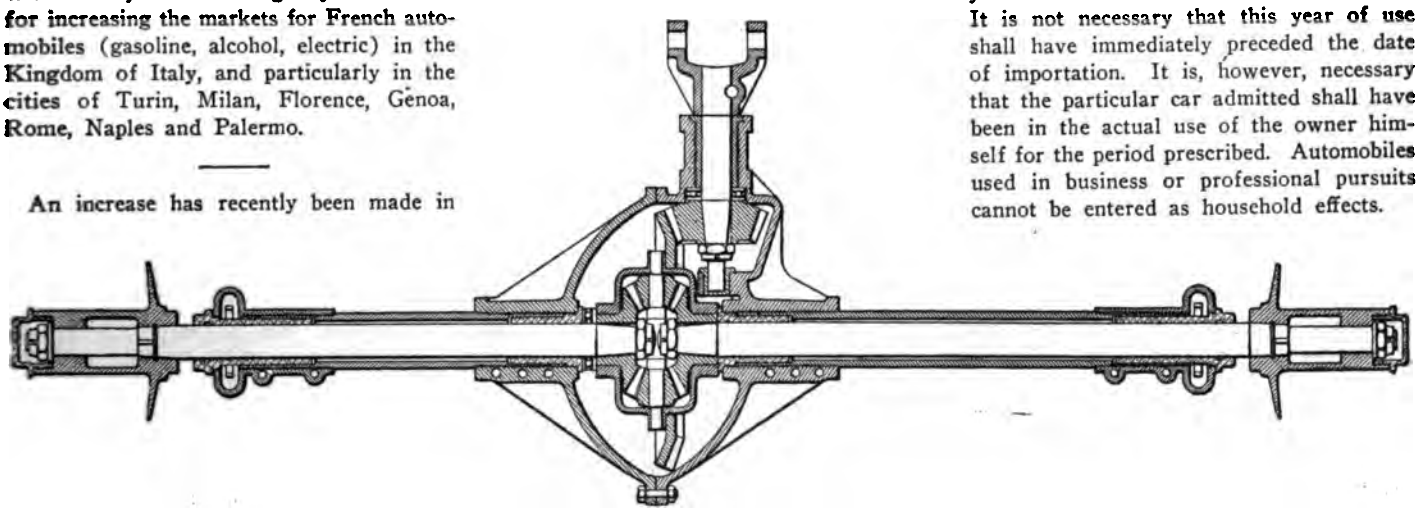
The Danish Automobile Club and the automobile clubs of Stockholm, Gothenburg and Malmoe in Sweden have decided to jointly organize a long distance endurance contest for 1905. The route of the contest, which is 660 miles in length, is as follows: Stockholm, Copenhagen, Frederickshaven (Jutland). Simultaneous with this endurance contest for automobiles and motor cycles, a contest for motor boats will be held over the course Copenhagen-Gothenburg-Stockholm, through the Gothenburg Canal and Venern and Vettern Lakes.

A writer in an automobile paper suggests an application of chemical salts to roads as a means of laying the dust. "Calcium chloride is practically," the writer says, "a waste by-product of several manufacturing processes—for example, the extraction of copper from burnt pyrites, Weldon's chlorine process, the ammonia soda process and the manufacture of chlorate of potash. It is highly deliquescent and soluble in water. Strong solutions of this applied to the roads would keep them almost permanently damp." The writer claims that "it would be cheaper than oils and would be without their objectionable odor, and being a neutral salt, would be harmless to motor-car tires, etc." "If this be true," the editor of the motor journal says, "magnesium chloride, slightly more expensive, but still a cheap salt, ought to be quite as effective. It occurs in large quantities in combination with chloride of potash in the Stassfurt mines in Germany and is also a by-product of manufacturing processes." — Marshal Halstead, Consul, Birmingham.

Entry of Foreign Cars Free of Duty.

The U. S. Treasury Department recently issued a circular in regard to the importation, free of duty, of automobiles of foreign make. In brief, the facts set forth are these:

Free entry under bond is accorded to those cars of foreign manufacture which are brought here either by residents or non-residents of the United States for touring purposes, whether they are accompanied by the owner or not, and may remain in the country for a period of three months. Cars are admitted as household effects upon the filing of an oath that they have been used abroad by the owner for a period of one year or more either consecutively or not. It is not necessary that this year of use shall have immediately preceded the date of importation. It is, however, necessary that the particular car admitted shall have been in the actual use of the owner himself for the period prescribed. Automobiles used in business or professional pursuits cannot be entered as household effects.



French Live Axle.

LEGISLATIVE AND LEGAL.

Milwaukee Ordinance.

The new automobile ordinance of Milwaukee, Wis., went into effect on Septembr 14. Under it cars must be registered and numbered, for which a fee of $1 is charged. The number must be carried at the back of the car, must be of white metal, four inches high, on a dark background, and must be followed by the letter M. No certificates will be granted to applicants under eighteen years of age, nor to persons not having the use of both arms.

Each car must be equipped with a gong or horn and fitted with brakes capable of bringing it to a stop within ten feet when traveling at the rate of ten miles per hour. The carrying of a light, after dark or before dawn, which shall show white from the front and red from the rear is required. It is also stipulated that no part of the machine shall be left running while the car is standing unattended. The speed limit is placed at twelve miles per hour for a direct course and four miles for turning corners.

For violating the ordinance the minimum fine is $1 and the maximum $50. The same ordinance applies to motorcycles, except that their numbers are to be but three inches high.

The Mayor of Duluth, Minn., has issued an order to the police to strictly enforce the automobile law.

The Cranston (R. I) Town Council has passed an ordinance limiting the speed of automobiles in the center of the village to four miles per hour.

The automobilists of Grand Rapids, Mich., are endeavoring to secure State legislation to prevent the various cities from passing local automobile laws.

The Markleville, Ind., Detective Association has been formed by the farmers in that vicinity, for the purpose of enforcing the automobile ordinance, it is said.

An ordinance has been submitted to the city council of Davenport, Ia., which limits the speed of automobiles to ten miles per hour and requires that cars be registered and carry numbers nine inches high.

The automobile owners of Columbus, O., have been notified by the City Auditor that they must pay their numbering fees. This action had been postponed in anticipation of the passage of a vehicle tax ordinance.

It is said that the Pope Mfg. Co. has posted notices in all its automobile factories calling upon its employees to respect the speed laws, and stating that in future those who suffer arrest must pay their own fines.

The Automobile Club of America has secured an injunction from Judge Wilmot T. Smith, of Riverhead, L. I., restraining the supervisors of Suffolk County from paying bills of deputy sheriffs for arresting automobilists for violation of the speed laws. Rewards amounted to more than $1,000, and other claims to about $3,000. One deputy alone claimed $500 in rewards.

Commercial Vehicle Notes.

The Great Western Railway has recently purchased and put in operation an Oldsmobile railway inspection car.

The International Lumber & Implement Co., of Portal, N. D., have purchased an automobile of the runabout type for use on their collection trips.

The Schenectady, N. Y., street railroad company will soon begin the operation of a line of gasoline-electric busses between Albany and Loudonville, N. Y.

The Manhattan Transit Co., of New York, announce that within six months they will have several lines of automobile stages running with three-cent fares.

The Osmond L. Barringer Co. has begun the operation of an automobile livery service in Charlotte, N. C. The cars will have street stands the same as other public hacks.

The livery firm of W. H. Mathews & Son, Ortonville, Minn., have recently added a touring car to their equipment, which will be rented out for longer trips for which they are called upon to furnish a conveyance.

Club Notes.

BUFFALO A. C.

The club participated in the events of "Automobile Day" at the Hamburg Fair on September 14.

GRAND RAPIDS A. C.

The visiting members of the Chicago A. C. were entertained on September 10 and 11. The programme included a race meet, dinner and club runs.

PHILADELPHIA A. C.

Plans are being made to hold a fall run on October 1. The proposed course runs through Ambler, Phœnixville, West Chester and Chester, and is said to provide good roads except for about ten miles.

MINNEAPOLIS A. C.

The club was entertained by M. W. Savage at his stock farm on September 10. Besides acting the part of host, Mr. Savage donated a cup to the winner of each of the races which were held on his private track.

A. C. A.

A circular has been issued by the Runs and Tours Committee with a view to obtaining the opinion of the club members on the advisability of holding a five days' tour to the Delaware Water Gap, Port Jervis, Philadelphia, Atlantic City and Lakewood, beginning October 10th. It is announced that club house privileges will be extended to club members at the Empire Track on September 24th.

New Incorporations.

Webb Co., Newark, N. J. Capital 50,000. Incorporators: Walter H. Bond, Paul Muster, Joseph Gerardt.

Western Automobile Co., Chicago. Capital $5,000. Incorporators: John E. Bensley, Neville Keever, Harry J. Dunbaugh.

H. Paulman & Co., Chicago. Capital $10,000. Incorporators: Henry Paulman, William H. Feindt, Jr., Edmund H. Spratlen.

Auto Engine Works, Minneapolis. Capital $200,000. Incorporators: Charles H. Scholes, William T. Rogers and W. J. West.

The Contract Machine and Automobile Co., Niagara Falls, N. Y. Capital $5,000. Incorporators: F. V. Simpson, Max Ambury, S. P. Franchot.

South Side Auto Co., St. Louis. Capital $5,000. Incorporators: C. H. Michaelis, William R. Orthwein, Newman Samuels, John Hoerr, Jr., Louis A. Hoerr.

Exide Sparking Batteries.

The Electric Storage Battery Co., Philadelphia, Pa., are marketing a storage battery specially designed for sparking purposes. The elements of the cells are of the Exide type and the battery terminals are flexible and protected by a layer of lead, hence are non-corroding. The cells are built up with wood separators and are closed by a fusible sealing compound. A rubber stopper is placed in the cover and is removed when it is desired to replenish the electrolyte or to charge the cell, in the latter case to allow of the escape of the gases formed particularly toward the end of the charging process. The cells are made in four sizes, with 5, 7, 9 and 11 plates respectively, the corresponding capacities being 33, 51, 68 and 85 ampere hours. The cells are put up in hard rubber jars, all of 7 inches height and 5 5/16 inches length, and width varying with the number of plates. The weight per cell varies from 8 lbs. for the 5-plate size to 16¼ lbs. for the 11-plate size. The complete batteries are put up in wood boxes, with drop handles if desired. These batteries can be charged from house lines, provided the service is on the continuous current system and the proper resistance is inserted. The cell must be cleaned before the sediment in the box reaches the bottom of the plates. For this purpose it can be taken apart by removing the cover of the case, which will pass over the terminals after the set screws in the connectors have been taken out. The sealing compound is then loosened with a hot putty knife, the cement lifted out, the electrolyte poured off, and the sediment in the bottom of the jars washed out by thoroughly flushing with a hose. Any broken separators are then replaced, the elements put back in the jars, which are filled with new pure electrolyte of 1,250° specific gravity. After charging at the specified rates until the gravity of the electrolyte stops rising, it is adjusted to 1,300° specific gravity and the cell resealed.

MINOR MENTION

It is anounced that an automobile factory will soon be established in Ypsilanti, Mich.

Plans are on foot for a tour of automobilists through the White Mountains in October.

The National Battery Co., of New York, has increased its capital stock from $500,000 to $1,000,000.

Fire Commissioner Doyle, of Brooklyn, N. Y., is to have an automobile for use in making his inspection trips.

E. E. Morand will open an automobile salesroom and garage at the corner of Elm and Thomas streets in Westfield, Mass.

Reed and Underhill, the Boston agents for Knox cars, will soon occupy a new two-story building especially designed for them.

The U. S. Agency of the Michelin Tire Co. informs us that the grand prize has been awarded their tires at the St. Louis Exposition.

The Chauslon-Lyon Motor Supply Co., of 930 South Main street, Los Angeles, Cal., have recently entered the automobile supply business.

A company is being formed in Muncie, Ind., to make the "Muncie" car, which, it is understood, will be of the gasoline touring car type.

C. N. Davidson, of Portland, Ore., who fired a shotgun at a passing automobile, is held in jail on a charge of assault with a dangerous weapon

The Warner Gear Co., of Muncie, Ind., have recently completed their new factory which is equipped with electrically driven automatic machinery.

It is reported that the Black Diamond Automobile Co. is soon to occupy the plant formerly used by the Remington Automobile Co., in East Utica, N. Y.

Scoville & Peck, lamp makers of Hartford, Conn., have recently installed new machinery and thereby considerably increased their manufacturing capacity.

The Eisenhuth Horseless Vehicle Company, of Middletown, Conn., have executed a mortgage of $20,000 in favor of M. G. Read, of New York, covering machinery and tools.

The Packard Motor Car Co., of Detroit. Mich., write us that D. R. Densmore, driving one of their cars, completed a continuous run from Los Angeles to San Francisco on September 15th in the elapsed time of 53 hours and 40 minutes.

Harry Rogers, of Otis, Mass., has brought suit for $4,000 damages against the Pope Mfg. Company, of Westfield. A car driven by an agent of the company is alleged to have frightened the plaintiff's horse and as a result he was injured.

After October 1, P. F. Williams, of 147 Columbus avenue, Boston, will have the New England agency for the Ford and Marion cars. R. F. Coburn, formerly of the Crest Co., will be associated with him.

The Diamond Rubber Co., of Akron, O., have in course of preparation a book of instructions in regard to "The Use and Care of Motor Tires." It is said that the information contained will be of such character as to apply to all makers of tires.

The Thayer-Hovey Soap Co., of Darby, Penn., have put upon the market, under the trade name of "Tak-a-Nap," an automobile cleaner, which they say can be used effectively to remove grease from the hands and, mixed with water, to clean machinery or varnish.

It is proposed to take the delegates to the good roads convention, which is to be held in Rochester, N. Y., during the first week in October, for automobile rides over roads in that locality, so that they may see what is needed in the way of road building in Munroe County.

Edmund & Jones, of Detroit, Mich., write us that they are now equipped to build a full line of automobile lamps. Mr. Edmund was formerly with the Jno. W. Brown Mfg. Co., of Columbus, and Mr. Jones with the Badger Brass Co., both of which concerns are in the lamp manufacturing business.

The Brattleboro (Vt.) Automobile Club has issued circulars to manufacturers of motor cars and the owners in that locality inviting the former to exhibit their products and the latter to attend the automobile show, which will be held in connection with the Valley Fair at Brattleboro on September 28 and 29.

The claims of F. Hiorth, of Norway, and the Joseph Horn Co., of Pittsburg, against the bankrupt Conrad Motor Carriage Co., of Buffalo, have been adjusted. Hiorth ordered a certain steam machine from the company and received a car of different type. The Horn Co. sent four cars to the company to be repaired and received only one back.

The Phelps Motor Vehicle Co. have opened a general sales office at 43 Tremont street, Boston. F. W. Richards is sales manager. The company will continue to make their three-cylinder car, and will also turn out a 1905 model having a four-cylinder engine of 24-26 h. p., and a side entrance tonneau body. Aside from the engine, the construction of the chassis will be on the same lines as that of the three-cylinder model.

In an answer filed by Horace Lowry, of Minneapolis, in the suit for damages brought by John P. Wall against Mr. Lowry and others for damages resulting from a collision between the Lowry automobile and the Wall carriage on June 9, he denies all knowledge of, or responsibility for the affair. His car was being driven by another person at the time. The case is expected to establish the limit of the responsibility of the owner of the car in such cases.

Brighton Beach Races.

The annual automobile race meet at Brighton Beach, N. Y., track will be held on October 22 under the auspices of the Brighton Beach Automobile Club. The date for the event has been selected with a view to making it possible for a number of the cars which run in the Vanderbilt cup race to enter. Entry blanks may be had of Alfred Reeves, 150 Nassau street, New York City.

Poughkeepsie Races.

On Friday, September 16th, an automobile race meet was held at the Dutchess County Fair Grounds in Poughkeepsie, N. Y. Chief honors were scored by the 60 h. p. Mercedes car of E. R. Thomas which won both the ten mile open and a special pursuit race in which it had the Ford light racer for a competitor. The latter car also came in for a large part of the glory, for it won from its larger rival (the Mercedes) the ten mile handicap, with an allowance of twenty-five seconds.

Close finishes were provided by the five mile handicap, in which all the starters came into the home stretch together in both the second and final heats In the second heat the Ford overtook John Jacob Astor's 20 h.p. Mercedes, driven by B. Morgan, at four and three-quarters miles, and led in the finish by fifty yards. In the final heat the three leaders were close together, with J. Van Benschoten's car being rapidly gained upon by Col. Astor's Mercedes and A. S. Lee's Pope-Toledo, which finished in the order named.

The fastest time of the day was made by Thomas's Mercedes in the pursuit race. Three successive miles were covered at the rate of 1:02.

The attempts of the management to prevent the raising of dust by sprinkling the track with oil were not altogether successful. The attendance was estimated to be about 10,000.

E. R. Thomas has entered his 60 h. p. Mercedes in the International race at the Empire Track meet, September 24th.

The program for the two days' meet of the Chicago A. C. includes besides the races for the various classes based on weight; a three mile stop and start race, a five mile event for cars costing less than $1,000, two ten mile handicaps, a pursuit race, gymkhana, a slow race and a special event for club members.

The dates for the races at Rockford, Ill., have been changed to October 5th and 6th.

The Boston Branch of the Fisk Rubber Co. are installing a plant for the purpose of retreading old tires of all makes.

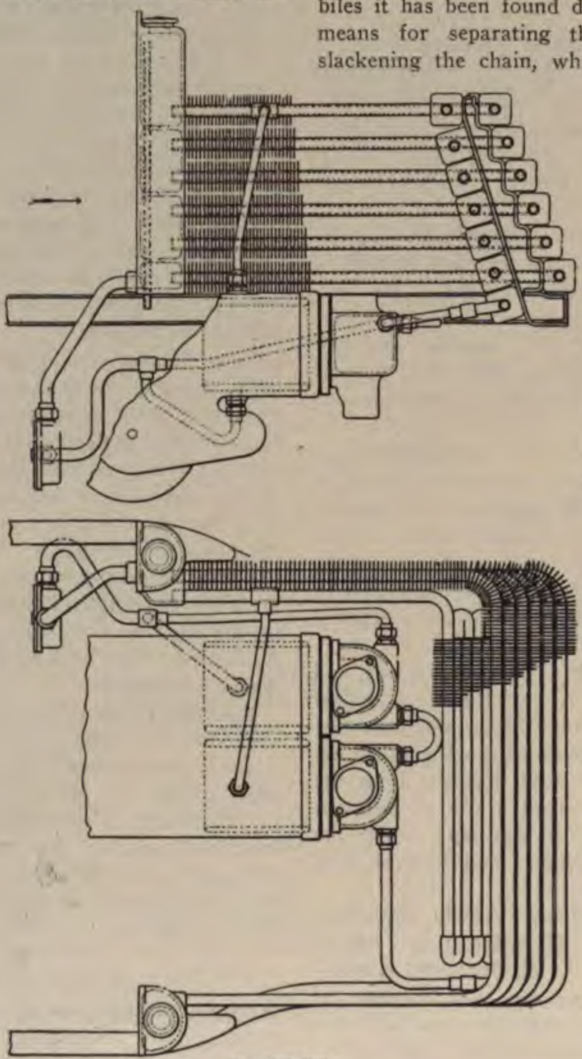
MOTOR VEHICLE PATENTS.

United States Patents.

769,582. Water-Cooling System for Explosion Motors.—Herbert Austin, of Erdington, near Birmingham, England. Sept. 6, 1904. Filed Aug. 6, 1902.

The water from the jackets flows to and fro through a connected series or system of gilled cooling-pipes between two upright headers or chambered tanks of relatively small capacity which serve to change the direction of the zigzag flow through the cooling-pipes and insure that the system is kept full of water. The hot water from the jackets enters the upper part of the system of cooling-pipes and flows downward from one to the other to the pump, which forces it again into the jackets.

Another feature of the invention is the means provided for permitting the steam and air to escape to the atmosphere from the chambers in the upright headers or tanks. In the partitions which separate the superposed chambers are small and always open apertures, which permit the air and steam to rise to the upper chamber of the series, and from this chamber the air and steam escape through a restricted outlet to the atmosphere. The cooling water is supplied to the cylinder jacket and valve chest jacket through separate conduits, whereby each is supplied with water at substantially the same temperature, and an auxiliary set of cooling pipes is supplied for preliminarily reducing the temperature of the water from the valve chest jacket before it enters the main system of cooling pipes.

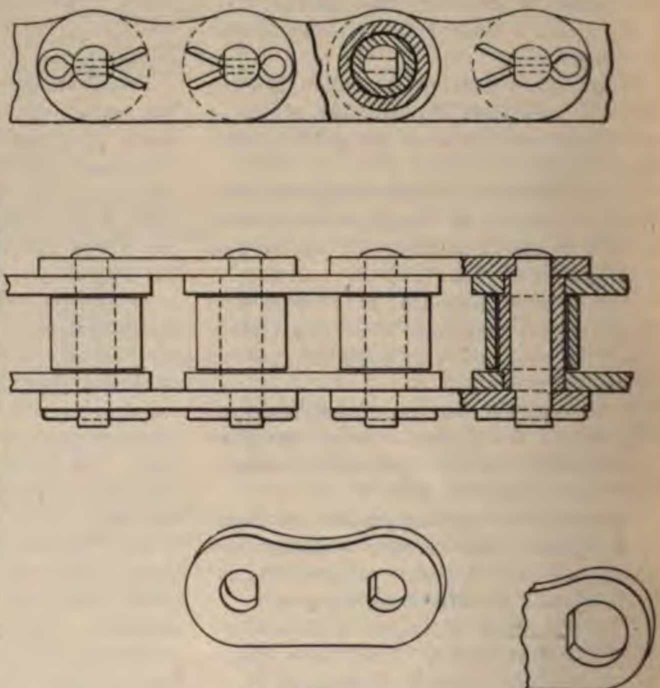


No. 769,582.

769,971. Drive Chain. — Clarence E. Whitney, of Hartford, Conn., Sept. 13, 1904. Filed March 5, 1904.

In the practical operations of automobiles it has been found difficult to provide means for separating the links without slackening the chain, which can easily be manipulated in spite of accumulations of dust and grit on the oily surfaces of the chain. The present invention aims to provide such means, making it possible to easily separate and rejoin the links at any point of the chain irrespective of the state of cleanliness of the latter. The single claim describes the invention as follows:

A drive-chain comprising pairs of links having holes of irregular contour through their opposite ends; bushings to unite said links, the ends of said bushings fitting tightly in said irregular holes flush with the sides of the links, constituting with the latter a rectangualr chain element of rigidly united parts; round pins to extend through and beyond said bushings, rotatable in the latter, the ends of said pins extending from the bushing outward being flattened on the same side; other links to fit over the flattened ends of the pins to constitute another rectangular chain element, one of each pair of the last-named links being immovably secured on the pins at one end thereof, the other link being removably secured on the opposite end, and cotter-pins to extend through one end of said round pins at right angles to the flattened side thereof to secure said removable links in position.



No. 769,971.

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COMMUNICATIONS.—The Editor will be pleased to receive communications on trade topics from any authentic source. The correspondent's name should in all cases be given as an evidence of good faith, but will not be published if specially requested.

☞ One week's notice required for change of advertisements.

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Precautions Against Freezing.

With the arrival of cold weather we take occasion to remind our readers of the necessity of taking precautions against freezing of the cooling water of gasoline cars and the feed water in the pipes in steam cars. Cases of neglect in this respect are especially frequent during the first few cold spells of the season, and often result in the bursting of water jackets and pipes. If no anti-freezing fluid is used in the cooling system, it is advisable to drain off all the water from a car when putting it in the house at night, but the cooling system should be filled with some anti-freezing fluid at an early date. Of these there are quite a number, and opinion varies as to their relative merits. Glycerine solutions of fifty per cent. or thereabout, have been used to some extent, but are unsatisfactory because glycerine is expensive, fouls rapidly and attacks rubber hose. Calcium chloride solution (about 5 lbs. of hydrated calcium chloride crystals to one gallon of water) has been used extensively, and is on the whole quite satisfactory, although it requires some attention to keep its density fairly constant. If the solution is allowed to become too dense, owing to evaporation of the water, crystals are likely to form in the piping and stop circulation. On the other hand, if there is considerable leakage from the system and only pure water is added the solution may become too dilute and may freeze if the temperature of the atmosphere is very low. In purchasing calcium chloride (which is generally offered at 8 cents a pound), make sure that chloride of lime is not substituted and that the salt does not contain any free acid, as if it contains acid it will attack the metal walls of the circulating system. The test is made with litmus paper which will be turned red if free acid is present. In preparing the calcium chloride solution, the best method is to first make a saturated solution (about 15 lbs. of chloride to one gallon of water), and then dilute this by adding two gallons of water.

During the past year a light grade of oil, known as refrigerating machine oil, has been used to some extent, apparently with considerable success. It remains fluid at the lowest temperatures, and hence does not prevent circulation in extremely cold weather. This oil probably requires less attention and is less expensive (owing to the very slight evaporation) than any of the other cooling fluids, but it is, of course, less cleanly, and also gives off a somewhat offensive smell.

Wireless Ignition.

The above is perhaps not absolutely correct as a designation of the new system of ignition suggested by a Belgian savant, F. de Marc, Director of the Electrical Laboratory of Brussels, for wires are not entirely discarded, but it is justified in so far as it is based upon the same principles as the "wireless" telegraph. It is well known that in a wireless telegraph installation, wire is used to a certain extent, and "wireless" is therefore a misnomer which efforts are being made to replace with a more logical term. In Germany, for instance, it is commonly referred to as spark telegraphy.

M. Marc's proposal contemplates essentially a wireless telegraph outfit in connection with a gasoline motor. Such an outfit consists of a vibrator or sender and a resonator or receiver. The vibrator is nothing more or less than a jump spark coil with its secondary terminals connected to suitably shaped spark points arranged opposite each other in a glass tube, while the receiver consists simply of a loop of wire, the opposing ends of which are

brought into proximinity with each other. When the coil is set in operation, a continuous series of sparks passes between the discharge terminals connected to it, and a vibrating effect known as Hertzian waves radiates from the terminals in all directions as sound radiates from the point where it is produced.

When these radiations strike the receiver or resonator, they produce therein a succession of electric impulses, resulting in sparks passing between the terminals. It has been found that electric conductors are opaque to these waves, while electric insulators offer no resistance to their passage. M. Marc therefore inserts a plug containing a quartz window in the combustion chamber wall, where ordinarily the spark plug is located, and arranges the vibrator terminals and the receiver on opposite sides of this window, the former outside the cylinder, the latter inside. It should be understood that the coil is connected to a battery in the ordinary way, and that its period of operation is determined by a spark timer or circuit breaker.

The idea is interesting, but its practical availability seems rather remote. The apparatus is essentially the same as that used for ordinary jump spark ignition, except that in place of a jump spark plug a Hertz receiver is used, and the obvious advantage of the new system would therefore be the elimination of all the troubles to which plugs are liable. It is also claimed that the spark points may be located in the center of the combustion space, which is thought to offer advantages in the way of more rapid inflammation of the charge. It is evident, however, that no consideration has been given to the effect on the resonator of the high temperature in the combustion chamber. If located at the center of the combustion space, it would soon become incandescent and produce preignition, and would be quickly destroyed by the heat. The spark plug industry is therefore not in immediate danger.

Automobiles for Traveling Salesmen.

We have referred several times in the past to the growing use of automobiles by traveling salesmen, and have recently printed a number of articles from readers using cars for this purpose. It appears that the automobile is particularly suitable to taking orders for goods salable in every small town. Many of these towns have insufficient railroad accommodations, and a salesman loses much time waiting for trains, while if he travels by automobile he can leave whenever he has finished his business.

A large territory can thus be covered from a central point in one, two or three day trips. Greater quantities of samples can be carried, and small orders of goods, if they are compact and light, can even be directly delivered from the vehicle. When a salesman travels by train he is usually obliged to carry heavy sample cases around to his different customers, while with an automobile he can drive directly to their places of business. Further, while he is soliciting orders his mind need not be troubled about railroad time tables and fears of missing his train. For such work the automobile would appear to be an all round convenience. In smaller towns, livery stable keepers are usually glad to store a car over night, while in all larger places regular garages are to be found. It is, of course, evident that a high grade, reliable machine must be selected for such work. for if the car were out of commission much of the time, and broke down frequently on the road, its use would hardly prove profitable. The fact that in the several cases which have come to our notice the owners were well satisfied with their experience, shows quite conclusively that modern autos are equal to such exacting demands.

The traveling salesman who touches only at the larger towns, and consequently makes long trips between stops, will not find the automobile advantageous from an economic standpoint, as for long distance travel the automobile cannot compete with the railroad. The former is essentially a vehicle for short distances.

Numbering Useless for Identification Purposes.

The owner of an automobile cannot be held responsible for infractions of the law committed by other parties with his machine, and for this reason a charge brought against an owner whose machine has been seen driven at illegal speed, cannot be upheld unless he can be positively identified as the driver when the offense was committed. This opinion has been confirmed by a number of recent court decisions, and it has been firmly established that identification by registration number alone does not suffice. The numbering feature was introduced in automobile legislation for this very purpose, and was undoubtedly suggested to legislators by the numbering of cabs and other public vehicles. There is a vast difference, however, between a public and a private vehicle, because the former is practically always driven by the same person, which is not the case with a private car. Besides, drivers of public vehicles usually wear identification badges, and these and not the numbers on the vehicle are depended upon for identification in cases of complaint against the drivers.

In a recent case in which this question came up, the prosecution waxed very indignant when challenged to prove the identity of the occupants of the car, claiming that as all of them had worn large masks, this was entirely impossible. The case had to be dropped.

Numbering having thus been shown useless for identification purposes, the question arises, Does it serve any purpose at all?

Freak Inventions.

Most of the patents on automobiles and accessory apparatus issued each week are now of a fairly practical character, many of them being taken out by men connected with the different factories; but occasionally some freak idea makes its passage through the Patent Office, reminding one strongly of an earlier period. Thus, last week a patent was issued on an arrangement whereby an air pump carried on the frame of the car is permanently connected to the different tires as the car is in motion. The air is led through the hollow axle, a revolving joint and a flexible tube to the tire valve, and the tire can be pumped up while the car is running. With a mechanically driven pump of fairly large size, it would require a pretty large puncture to leak air faster than could be pumped in to the tire, and punctures would therefore lose their terrors, as a journey could be continued in spite of them, without damage by rim cutting. This evidently was the inventor's reasoning and he, no doubt, believes that he "fills a long felt want" with his invention, but we doubt very much whether any automobilist would care to have flexible tubes dangling from the outer ends of his axles where they would be constantly exposed to injury; or undertake to preserve the air-tightness of four revolving joints, subjected to constant wear whenever the wheels turn. The evil of possible tire leaks appears small indeed as compared with the onus of this cure.

Double Solid Tires.

ile the tire problem for heavy vehicles l unsettled, we observe that for omni- and medium weight delivery wagons ractice of placing two solid tires side le is extending both here and in Eu- Such an arrangement seems espe- favored for the driving wheels, which the greater weight, withstand the s of driving and determine the ten- of a car to skid. At first sight the f two separate tires placed side by in place of a single one of double the ity, does not impress one favorably, f the most apparent objections being reat width of the ground contact of wheel, which would seem to result in d deal of slipping at the outer edges e contact in turning. Upon closer in- ation, however, a number of advan- s features are seen in the arrange- Evidently two tires, placed side by on the same rim, have substantially the carrying capacity of a single tire e same size, and are equally effective ushioning purposes when proportion- oaded. On the other hand, if the amount of rubber was put into a tire, the same carrying capacity be secured if the tire was made suf- ly wide and flat, but in that case it have less cushioning effect, for the that this effect does not depend on the compressibility of the rubber, ore on the deformability of the tire, he latter would naturally be com- vely small with a wide, flat tire. In e, a tire of twice the carrying ca- of another has usually considerably than double the amount of rubber in hus double tires would seem to allow er greater carrying capacity or great- hioning effect than single tires with me amount of rubber. There is also doubt that double tires have a ten- to prevent a vehicle from skidding.

Some Automobile Statistics.

have frequently had inquiries in the regard to the number of automobiles in the country, or the number pro- during the current year, but there far been little reliable data available ich to base an estimate, and we have ore been unable to make a satisfactory to these inquiries. Now, however, most of the important automobile and cities keep an automobile regis- appeared to us possible to make a accurate estimate of the number of use, and as many of our readers are undoubtedly interested to learn the approximate strength of the automobile movement, we addressed a circular letter to most of the officials keeping these registers, asking for data upon which such an estimate might be based. The officials very kindly responded to our requests and furnished all the information asked for.

Owing to the fact that sometimes when a car is sold by its owner the certificate is not returned, it is impossible to obtain absolutely correct figures, even for the States which keep registration lists, but we do not believe that any appreciable error is introduced in the figures by this fact. It has been our aim to make these estimates in an entirely unbiased spirit, and in case any of our deductions seem unwarranted, we shall be glad to print any criticism to that effect.

In New York State the registration list was started in May, 1901, and on September 1 last, 14,119 vehicles were registered Many of these are, of course, out of use by this time. The new registration law went into effect on May 4 last, when 10,036 machines were registered. The Secretary of State estimates that between 3,000 and 3,500 certificates were returned when the new law went into effect, showing that that number of the cars registered up to then were still in use. Assuming 3,000 to be the correct number, and adding the 4,038 which have been registered since May 4 last, we find that certificates have been issued since that date for 7,083 cars. From this should be deducted 5 per cent., which an actual count shows to be registered by non-resident owners, and 350 (300 to 400, according to the Secretary of State) motor cycles, leaving roughly 6,400 as the number of cars owned in New York State. As the population of the State is 7,268,000 (1900 census), this gives one car per 1,130 inhabitants.

The secretary of the Massachusetts Highway Commission writes that on August 31 the commission had registered 6,394 automobiles and 929 motor cycles, not including the machines of manufacturers and dealers. It had issued 171 registration certificates to manufacturers and dealers. During the month of August 497 machines owned by private parties were registered. The first registration certificate was dated July 21, 1903. The number of cars which have changed hands since that date, according to the number of certificates returned, is 820.

According to a count, 11 per cent of the cars are registered by non-residents. Subtracting from the actual number registered, those owned by non-residents (700) and those sold, and adding one for each manufacturer and dealer registered, we find the total number of cars owned in Massachusetts to be 5,045. With a population of 2,805,000, this makes one car for every 556 inhabitants.

The Secretary of State of Connecticut writes, under date of August 31: "The list of registered automobiles in this office was begun May 23, 1903, and at the present date has reached 2,325. Of this number probably from 200 to 225 are from outside of Connecticut. The number registered during the month now ending was about 130. We cannot give you any definite idea of the number of dead certificates, as no record has been kept, and in many cases we judge that this requirement of the law has not been complied with, but that owners of new machines are using numbers of old machines in connection with them. Considering, also, that many people in Southwestern Connecticut have registered in New York, instead of in their own State, we deem it within bounds to say that the number of motor vehicles in Connecticut at the present time is not less than 2,000."

As the last census credits Connecticut with 908,000 inhabitants, it has one automobile for every 454 of its population.

The Deputy Secretary of State of Rhode Island informs us that in that State there have been registered up to September 1, 800 automobiles and 130 motor cycles. Twenty-eight dealers have also been registered. Non-residents do not need to register, and as the registration law went into force only the present year, we may reasonably place the number of cars owned in the State at 800. The population is 428,000, giving one car for every 535 inhabitants.

Although New Jersey has a registration law, it is somewhat difficult to obtain from the registration list the number of cars owned in the State, because registration began about a year and a half ago (March 23, 1903), and a large number of the cars are registered by non-residents. The number of registrations on September 1 was 7,100, and there had been about 500 cancellations, leaving 6,600. According to a count, almost exactly one-half are registered by non-residents, leaving 3,300 cars owned in that State.

In Iowa 759 licenses had been taken out prior to September 1. As five were issued to non-residents and 10 were cancelled, there were 744 cars in the State at that date.

The assessment rolls of Minnesota show that 966 cars were owned in that State on May 1 last, 374 of them in Hennepin county (Minneapolis). It is reasonable to assume that by September 1 the number had increased to 1,000.

In Maryland 524 cars have been registered, about one-half of which by non-residents of the State. Maryland may therefore be credited with 260 cars.

These are all the States in which official figures pertaining to the entire State are available. In the rest of the more important automobile States the chief cities keep automobile registers.

Thus the City Clerk of Cleveland writes us that the total number of licenses issued there up to September 1 was 1,520; the first license was issued two years ago, in August. Possibly 2 per cent are non-resident owners. During the month of August 64 licenses were issued.

The chairman of the Board of Automobile Registry of Chicago writes: "Replying to your inquiry of the 30th ult., I am pleased to submit the following information: Total number of automobiles registered up to September 1, 2,415. List was started February 28, 1900. Motor cycles are not included in list. Proportion of non-resident owners registered, including suburbs, about 5 per cent. Cars registered during August, 1904, 118."

The County Clerk of Jackson County, Mo. (Kansas City), writes that he has issued 112 automobile licenses from June 20, 1903, to September 1, 1904. They do not license motor cycles.

The clerk of the Registration Bureau of Detroit furnishes the following information: Total number of automobiles registered to September 1, 1904, 1,026 (since December 1, 1903), of which were non-residents, 10. During the month of August, 1904, there were registered 86. There were transferred to other parties from certificates issued, 11.

The above figures from city registration lists are of comparatively little value for determining the number of cars in use in the respective States. All of these lists, with the exception of the last, were begun too far back to permit of even a fairly accurate estimate of the actual number of cars in use in the respective cities being made from them. In the case of Detroit, it is justifiable to conclude from the list that there are about 1,000 cars in use in the city.

Pennsylvania also offers exceptional difficulties in an attempt to estimate the number of cars owned there. Registrations began in May, 1903 and may be made in any county of the State. With the Prothonotary of Philadelphia, 1,056 cars had been registered until September 1, including 174 by non-residents of the State, leaving 882 registered by Pennsylvanians. Only 14 were reported sold, but it is quite evident that more must have changed hands. Eight hundred would probably be a fair estimate of the number of cars owned in the Quaker City. In Allegheny county (Pittsburg) 581 cars had been registered up to September 1. Allowing for registrations by non-residents (about 1 in 40), and cars sold, Pittsburg would seem to have between 400 and 500 cars.

The following table gives the population and cars owned in the eight States for which official figures are available:

State.	Population.	Cars.
New York	7,278,000	6,400
Massachusetts	2,805,000	5,045
New Jersey	1,883,000	3,300
Connecticut	908,000	2,000
Minnesota	1,751,000	900
Rhode Island	428,000	800
Iowa	2,231,000	744
Maryland	1,188,000	250
Total	18,462,000	19,439

These eight States have less than one-*quarter of the total population of the* United States, but it would, of course, be entirely wrong to estimate the cars owned in the rest of the States on the basis of relative population. The very fact that the above eight States have registration laws, while the rest of the States have none, indicates that in the former the automobile has become such a factor in public life as to call for legislative control of its use. However, some of the chief automobile using States are not included in the above list, as, for instance, Ohio, Michigan and Pennsylvania.

A comparison of the subscription list of the Horseless Age with the above list of cars owned in eight of the chief automobile States shows that the number of yearly subscribers in each State is closely proportional to the cars owned in that State. It would therefore seem justifiable to estimate the number of cars owned in States keeping no register from the circulation of the Horseless Age in these States. Almost exactly one-half the total subscription circulation of the paper is in the above eight States, so that on the basis of this proportion the total number of cars in use in the country is about 39,000. The number of cars in the different States, estimated on this basis, is as follows (approximately): Maine, 450; New Hampshire, 525; Vermont, 525; Pennsylvania, 3,500; Delaware, 75; District of Columbia, 200; South Carolina, Georgia, Florida, Alabama, Mississippi and Louisiana together, about 1,000; Texas, 250; Ohio, 2,200; Indiana, 1,000; Illinois, 1,600; Michigan, 1,500; Wisconsin, 800; Kentucky, 200; Tennessee, 200; Missouri, 700; Kansas, 350; Nebraska, 250; South Dakota, 250; North Dakota, 150; Colorado, 300; Washington, 150; Oregon, 150; California, 1,800; Arizona, Arkansas, Idaho, Indian Territory, Montana, Nevada, New Mexico, Oklahoma, Utah and Wyoming together, 300 cars.

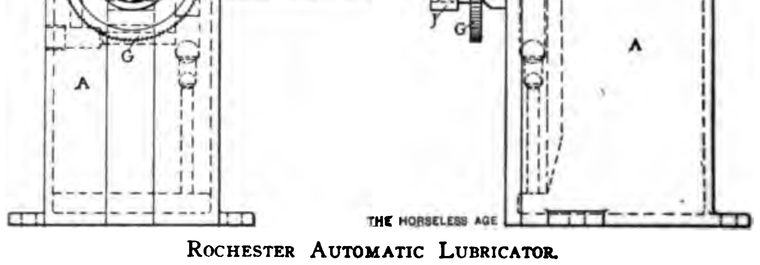
Force Feed Lubricators—II.

By Albert L. Clough.

The Automatic Lubricator Co., of Chicago, manufacture a multiple feed lubricator of the gas pressure type which is known as the "Simplex-Multiplex." The dashboard form of this device employs a reservoir of satin finished, burnished brass which, together with the sight feeds, is intended to be mounted upon the dash. The reservoir and fittings are octagonal in section and the former is provided with plate glass ends and suitable brackets for attaching it. This type is furnished in one and two quart sizes and with any number of feeds from two to eight inclusive. The "Spider" and "Bulls-eye" multiplex lubricators may be installed with their reservoirs on the dash or under the hood, as desired, with the sight feeds on the dash or at the points of supply, as required. These reservoirs are octagonal in section with end support and plate glass front, and may be had in polished aluminum or satin finished brass for dashboard mounting, or in plain aluminum or iron for location under the bonnet or in the body of the car. The quart size is regularly furnished with from two to eight feeds, and the two-quart size with from four to ten feeds.

All multiplex lubricators are arranged to receive their feeding pressure from the crank case, cylinder or exhaust, as may be found convenient, and the pressure regulating valve adjusts it to an amount proportional to the engine speed. An oil check between the reservoir and the manifold which carries the sight feeds prevents any siphoning of the oil, gravity feeding or "blowing back" through the feed tubes.

Greene, Tweed & Co., of New York city, are the manufacturers of the improved pony Rochester lubricator for steam vehicle



Rochester Automatic Lubricator.

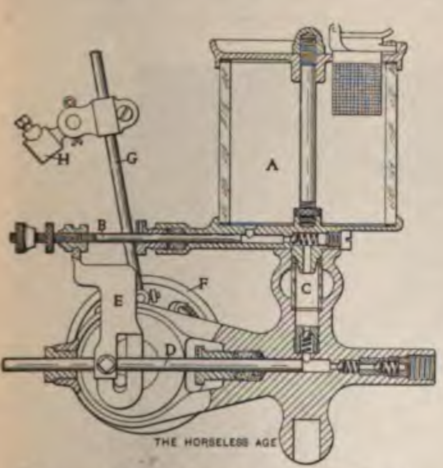
A, oil tank; B, cover plate; C, spring holding cover in place; D, pump plunger; E, sliding head communicating motion to pump plunger; F, eccentric; G, ratchet wheel; H, pawl; I, J, bell crank carrying pawl. (The arm J is connected by a link to some moving part of the engine.)

engines and of a lubricator for feeding the crank cases of gasoline vehicle motors. These are both of the mechanically operated pump type and single feed. The pump movement is obtained through a lever which receives its motion from some reciprocating part of the engine and which slowly turns, by means of an adjustable pawl, a ratchet wheel on the pump driving shaft. All working parts of these lubricators are of steel, and should wear very slowly. The "Pony Rochester" has a japanned oil reservoir and nickel plated works, and is filled by removing the cover, without the necessity of a funnel. Lugs are provided on the bottom of the reservoir for use in mounting it. Its capacity is one-half pint.

The single feed lubricator for gasoline cars has an aluminum reservoir of one gallon capacity, and the same mechanism as the Pony.

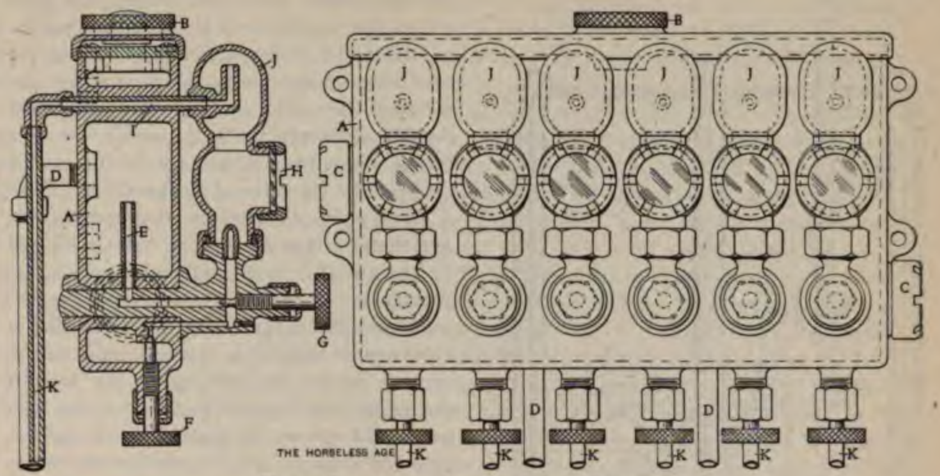
Manzel Bros., of Buffalo, N. Y., manufacture a line of individual pump lubricators and have brought out one especially intended for such steam and gasoline vehicles as require but one feed. This consists of a very compact form of piston pump which is driven by a slotted crosshead arrangement from a shaft that is turned by means of a ball clutch "step by step" motion actuated from a lever attached to some recriprocating part of the engine. In this lubricator the pump is not placed submerged in the oil reservoir, but is mounted below it. The oil reservoir is a large glass oil cup similar in appearance to the usual gravity feed type and its outlet is screwed into the pump cylinder. The suction valve of the pump is located in the outlet of the reservoir and the lubricant, after being admitted to the pump cylinder, is forced through a double check valve to the delivery point. Three sizes of reservoir are furnished; namely, one-third pint, one-half pint and one pint capacity.

A crank is provided upon the wheel con-



MANZEL BROS.' AUTOMATIC OIL PUMP.

A, glass oil reservoir; B and D, pump plungers; C, sight feed glass; E, cross-connecting piece for pump plungers, with slot for crank pin; F, ratchet wheel; G, rock lever; H, connector for operating rod.



THE CRANDALL LUBRICATING SYSTEM.

A, oil tank; B, filling cap; C C, gauge glasses; D D, oil supply and by-pass pipes of tank; E, stand pipe in tank through which oil passes to sight feeds; F, glycerine valve; G, oil feed adjusting valve; H, sight feed glass; J J J J, sight feed dome; I, feed passage; K K K K, feed pipes.

taining the block clutch by which it may be operated manually and oil pumped rapidly if desired. It is claimed that the driving mechanism is perfectly noiseless, on account of the absence of any ratchet and pawl mechanism, and that highly viscous oils, even when mixed with graphite, can be fed with regularity, independent of changes in temperature.

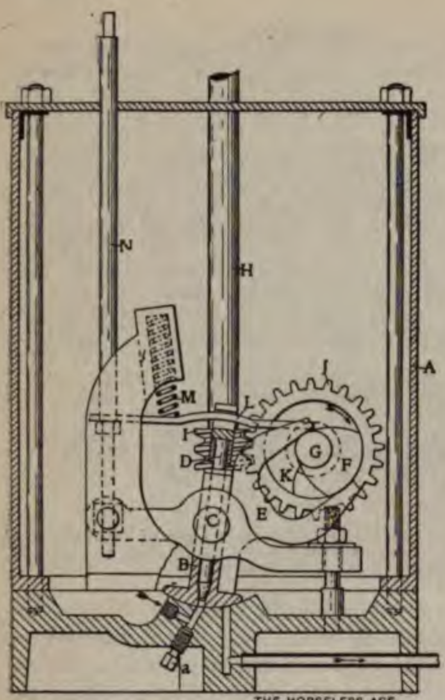
The National Sewing Machine Co., of Belvidere, Ill., manufacture the Crandall mechanical lubricator. This is of the multiple, sight-feed, dashboard type, with oil pressure continuously maintained by a single power-driven pump.

The oil supply tank, fitted with special strainers, may be located in any part of the car where it may be conveniently filled and where it may receive some heat from the engine or the muffler. The pump is of the vertical piston type, with slotted crosshead device, and is intended to be direct geared to the half-speed shaft, or run from this shaft or from the crank shaft by sprockets and chain. It has valves of liberal dimensions and is intended to be mounted upon a bracket attached to some convenient portion of the car. In this system an automatic pressure regulating valve is employed, in order to maintain a constant head upon the oil, and it is intended to be placed under the hood, with its regulating handle and indicator upon the dash, within easy reach of the operator. An oil-pressure gauge of the usual form is also mounted on the dash. The oil-pressure reservoir, the sight feeds, the glycerine or water supply for the sight feeds, the individual oil valves and the glycerine or water valves form a combination of very tasteful appearance for dashboard mounting. Connections are so made that the pump draws oil from the bottom of the supply tank and forces it to the pressure reservoir on the dash. From this a pipe leads to the inlet side of the pressure-regulating valve, and from the other connection of this valve back to the upper connection of the supply tank.

By adjusting the spring of the pressure-regulating valve, any desired pressure up to the maximum may continuously be maintained by its action. Thirty pounds per square inch or a little less is the pressure recommended by the manufacturers.

In starting the system into operation, sufficient water (or glycerine during cold weather) is placed in the pressure tank upon the dash to fill it to a point above the tops of the sight feeds, and lubricating oil is then forced in by hand operation of the pump to completely fill the tank above the water or glycerine. When an oil pressure has been created by operating the pump manually, the water valves, which are located under their respective sight feeds, are opened and the sight feeds completely filled with water or glycerine. After these valves are closed, the individual oil valves, located on the front of each feed, may be opened and set for the required flow. The fed oil passes downwardly from the pressure reservoir through a vertical pipe leading to the adjusting needle valve of each feed. Thence the oil rises in drops through the liquid in its sight feed and into the mouth of the flow pipe, through which it passes through a check valve to its point of delivery. The relative rate of speed of each individual pipe is determined by its needle valve, and the rate of feed of the combination as a whole is determined by the oil pressure which is carried. The check valve inserted in each feed tube at its point of delivery insures the pipe being full of oil at all times and provides for an immediate supply of lubricant when the engine is restarted. The liquid in the sight feeds may be instantly replenished from the supply in the pressure reservoir by opening the water valve. Sight glasses in the ends of the pressure reservoir indicate the condition of the reserve water or glycerine supply.

The Crandall lubricator is made with any number of feeds from five upward. It is regularly supplied in polished brass, the pressure reservoir, feeds and pressure gauge being highly finished.



HILL AUTOMATIC OILER.

A, oil tank; B, pump barrel; C, trunnion support of pump; D, pump plunger; E, cam follower for swinging pump; F, cam for swinging pump on its trunnions; I, worm; J, worm wheel; K, cam for operating pump plunger; L, cam follower for K; M, spring holding L to K and effecting force stroke of pump; N, pump stroke adjusting rod.

The Phoenix Metallic Packing Co., of Chicago, manufacture a line of individual pump, force feed lubricators, one of which—a single-feed, half-pint size—is recommended for use upon steam vehicles. This lubricator is square in form, with attaching lugs cast upon its base, and is furnished either nickel plated or enameled.

The submerged horizontal piston pump is driven by means of a horizontal slide bar which derives its reciprocating motion from a cam carried upon a shaft in the base of the lubricator. This shaft is rotated by an internal ratchet and pawl motion driven by a lever attached to some reciprocating part of the engine. The slide bar operates the pump plunger from outside the oil reservoir, and an adjusting screw is provided by which the length of the pumping stroke, and hence the quantity of oil supplied per stroke, may be exactly regulated. The oil is delivered from the pump to a two-way cock mounted on the oil reservoir, by which it may either be sent onward past a check valve through the feed tube, or be allowed to escape through a drop spout, thus indicating the rate of feed.

The Hill precision oiler is the product of the Steel Ball Co., of Chicago, and is a multiple feed lubricator with individual submerged pumps with vertical oscillating cylinders by which construction the use of check valves is obviated. A vertical ratchet-driven shaft passes downward through the reservoir carrying a worm which meshes *with a worm wheel on the horizontal* pump-driving shaft. This shaft carries the cams which not only produce the piston movements of the several cylinders but also the oscillation of the pump cylinders which determine the valve action. An individual outside adjustment is provided for the stroke of each pump, and the setting can be made while the oiler is in operation.

Each pump cylinder is mounted upon a horizontal trunnion, and its foot is formed on the arc of a circle and bears upon a stationary arc-shaped portion containing the inlet and discharge ports, thus forming a rotary plate valve. At the beginning of the suction stroke the opening in the foot of the pump cylinder is directly over the inlet port, and when the piston moves up the cylinder is filled with oil, during which action the discharge port is kept closed by an extension of the cylinder foot. When the cylinder is filled, it is oscillated just sufficiently to bring the cylinder opening directly over the discharge port, and an extension of the cylinder foot over the suction port. The piston then moves downward, discharging the oil through the feed pipe, after which action the cylinder oscillates back to its original position ready for another cycle.

Sight feeds will be furnished upon the oil pipes, if desired, but they are claimed to be an unnecessary complication, owing to the positiveness of action of this device. These lubricators are furnished in different sizes ranging from one-half pint oil capacity with one feed to ten pints capacity with ten feeds. If required, reservoirs of separate compartments are furnished for supplying two or more grades of oil.

A Tennessee Garage.

The States of Kentucky and Tennessee are not exactly in the fore front of the automobile movement, both being more or less mountainous, much devoted to horse breeding and little inclined to spend much effort in road improvement. Nevertheless, the automobile has secured a foothold in each, as witnessed by the recent formation of automobile clubs in some of the larger cities of each State (and perhaps also by the recent passage of automobile laws). The advent of the automobile in these States has also been marked by the establishment of storage and repair stations. One of the largest establishments of this kind in these two States is that of Rodgers & Co., 315 State street, Knoxville, Tenn., which is owned and operated by Cowan Rodgers. This business was established as a bicycle house in 1898, and when automobiles were first introduced in that section of the country, three years ago, Rodgers & Co. entered the field. To-day they have probably the largest repository for automobiles in the South, consisting of three floors 131x40 ft. each, or nearly 16,000 sq. ft. floor space. The main entrance to the building is at the rear and just at the left of this door is the concrete washstand on a 4-ft. elevation from the first floor and 8 ft. from the second floor. When the machines are brought into the garage, they are first taken on the wash pan and thoroughly cleaned before they are allowed to enter either the first or second floors. Directly to the left of this washstand is the electric elevator, running from the first to the third floor. There are tramways built from the rear entrance to the first and second floors, and this is found a most reliable means of transferring the machines from one floor to another.

At one end of the second floor is a fully equipped machine shop, the remainder of this floor being used for storage. At one end of the third floor is a suite of rooms, where the foreman of the shop and his family reside. A second telephone goes directly to his rooms, and no matter at what time of night a customer is in distress on the road, he can reach an experienced repair man by 'phone, with automobiles and complete kit of tools at his disposal. Cowan Rodgers, of this firm, is president of the Knoxville Automobile Club, and was one of the organizers of the same. Rodgers & Co. this year represented the Olds Motor Works and the Pope Manufacturing Co.

A TENNESSEE GARAGE.

TOURING ROUTES

Short Automobile Tour Through the Blue Mountains.

By Dr. Frederick Krauss.

It is now over three years since I bought y first automobile, and though I covered any thousands of miles with it, I never d sufficient confidence in the machine to k any prolonged journey, especially over ugh roads. Becoming convinced that tomobiles of present manufacture had any points of superiority, I purchased a nneau car of popular price and type. So r, I feel justified in my selection, as I ve had no repairs to make in the first ten eeks of usage, but I am aware that I am agging too early in the game.

Among the pleasures that I had promised yself with the new automobile was a trip om Philadelphia to the Delaware Water ap and surrounding country. Upon ascer-ining from various sources the different st routes, I was strongly advised to take e "river route," on account of its level d picturesque character—and decided to so. As a physician must arrange his va-tion in advance, the date was set and eparations were made for the journey.

The weather had been fine, with just enough in to keep the roads in good condition, til the night previous to the proposed p. Then a terrific rain and thunderstorm t in that raged for many hours. But it s a case of now or never, and having n told that the roads were in good condi-n and therefore ought to dry readily, a rt was made at 8.15 A. M., several hours ter the rain had ceased.

The road going out Broad street is of phalt and continues to the Old York Road—a magnificent turnpike, thirten miles long. The owners of this road have always prided themselves on keeping this beautiful macadamized roadway in the most perfect order, and rapid time was made, passing the many magnificent mansions of wealthy Philadelphians through Ogontz and Jenkintown to Willow Grove. Several stone bridges passed still have the year of their erection—1793—plainly marked upon a central smooth stone. This highway was the favorite route to New York in the days of the stage coach, and is finely shaded by old trees. The toll charge is thirteen cents to Willow Grove. At the latter place the left-hand fork of the road is taken to Doylestown. In places this road is good, then very stony, washed out and somewhat hilly. The low gear was used for a short distance soon after leaving Willow Grove, and again on the very long and steep hill entering Doylestown.

By keeping on the turnpike, we passed through Doylestown and went on our way to Danborough. The first crossroad on the right after passing the hotel is the Gardenville turnpike, leading directly to Point Pleasant on the Delaware River. This road is also in fairly good condition, level until near Point Pleasant, when a sharp curving hill soon drops us to the river road. The toll charge from Willow Grove to Danborough is eighteen cents, and on the Gardenville turnpike some more, making in all thirty-eight cents.

NERVOUS HORSES AND NERVOUS DRIVERS.

It was along this last turnpike that we met a number of nervous horses and more nervous drivers. One horse driven by a young man became much frightened, but apparently became tractable by my speaking to it. My surprise was great when the driver began to abuse me roundly for having spoken. Shortly afterward, we saw a team of two horses attached to a springless lumber wagon suddenly stopped by the driver, who ran ahead and pulled the horses to the side of the road, tying them securely and showing much excitement. We drove by slowly and saw that the passengers consisted of a woman with four children clinging to her, the oldest being about five years. They were badly frighteened, as was their mother, whose face was blanched and expressed intense fear. The horses did not even wink their eyes as we passed by.

The river road is very narow for a number of miles, barely wide enough for an automobile. It runs alongside of the Delaware and Easton Canal, operated by the Lehigh Coal and Navigation Co., and following the course of the Delaware River. It is for the most part densely shaded by thick woods, and was very wet and stony. The ruts were filled with water, which splashed all over us, in spite of moderately slow riding. In places heavy streams of water rushed in rivulets down the mountain side acros the road into the canal. This soaked our secondary electrical wiring, and caused us some trouble in trying to locate the cause of the missing or weak spark. Had we met a team or other conveyance coming in the opposite direction along the first part of this road, I do not know how we could have arranged a passage. Fortunately, we were the only ones out this morning, excepting the sailors and their families on the frequently passing canal boats. After some eight or ten miles, the roadway gets wider and sandier, and in places was excessively wet and muddy, making traveling anything but easy. It was so easy to skid into the canal, and though we may have needed a bath, we were not anxious to try it in that particular manner. We were cheered, however, by the news that from Riegelsville to Easton we would have a fine road for at least eight miles; so that when we reached Kintnersville, the road being better, we started at a lively pace and passed what I

Wind Gap from the South.

Near Saylorsburg.

STONY RIVER ROAD NEAR POINT PLEASANT.

took to be a barn, around a sharp corner. This, I later discovered, was a covered bridge leading to the road to Easton. After going five miles along the wrong road, following the trolley line, I inquired regarding the road and found that I had been rapidly approaching Philadelphia by means of the "hill" road through Plumsteadville, etc. This was discouraging, but we made rapid time back to Kintnersville and across the covered bridge.

WHAT CAUSES IGNITION TROUBLE.

Soon our ill-luck showed itself by a flat tire, which pumped up easily and seemed to retain air, but after proceeding a short distance further and plunging into numerous deceptive mudholes, we were compelled to stop by lack of electric current. I searched for some time before I finally separated the secondary wires beneath the carriage which had become leaky, due to the repeated soaking. I then stopped at a country hotel and asked the bibulous landlord for dinner for four, but was curtly told that Easton was but ten miles away, and that there I could get dinner.

The tire was again down, but after pumping we succeeded in going a few miles further, through Riegelsville, about eight miles from Easton. The tire then refused to be coaxed, and with the assistance of my chauffeur and of a chance acquaintance who happened along demonstrating a Duryea, a permanent repair was made by substituting an inner tube. The old inner tube had a leaky valve and had separated at the cement joint made by the manufacturers.

During this time the electric wires had dried in the warm air and the spark was again strong. About six miles from Easton we passed an old hotel that bore the legend "Black Horse Hotel, built in 1783" upon its signboard. We soon sped along the beautiful level macadam pavement at a lively pace, which brought us into Easton at 4.30 P. M., famished and tired. By the time we got supper and gasoline it was 5.30 P. M., and we were strongly advised not to try to reach the Water Gap that day. The roads, we were told, would be very bad. Our luck had changed, however. At the foot of the College Hill we turned sharply to the left and followed the river road, which is fine macadam and level, to Martin's Creek, and were easily able to average twenty miles an hour. At Martin's Creek the level road ends, as we took the "short route," soon passing between

THE "THREE CHURCHES,"

which are in close proximity, perched high up on the sides of the hill. It struck us as very peculiar that three different churches were built so close together, two on the left and one on the right of the road, when habitations seemed so few. However, we were kept busy climbing up the exceedingly long and steep hills which seemed to extend for a mile or so steadily upward. At one place I thought it advisable to let my helper get out and walk, as the hill seemed to require all the power of my machine on low gear, notwithstanding the fact that it is an excellent hill climber.

From the top of the hill an indescribably beautiful view is obtained of the Delaware River and its valley, on the south and east, as well as of the beautiful country to the west and northwest, where the long range of the Blue Mountains stretches away with but two visible breaks in its continuity, one at Wind Gap, the other at Water Gap.

DELAWARE WATER GAP.

A DECEPTIVE HUMP.

The road is fairly good, except that it is very hilly and has many so-called "thank-you-ma'ams," which are very large and almost turn the automobile upside down in clearing them. At one place, near the bottom of a steep hill, we approached an innocent-looking "slight" hump at fair speed, and when a few feet away, noticed that it descended abruptly on the further side for three feet, forming a deep gutter, possibly washed out. We jumped it, and fortunately landed on all-fours on the other side, right side up, and with only a severe shaking.

The road continues through Richmond to Portland, which we reached by 7 P. M., having made good time, considering the hilly nature of the road. From Portland the road follows the railroad through the Gap. The Delaware Gap is so narrow that there is barely room for the railroad and a wagon road, so that the latter is crowded along the mountain side and is exceedingly, even dangerously narrow. In many places it is impossible for two wagons to pass each other, the mountains rising abruptly on the one side and a steep precipice falling on the other to the railroad track, some thirty feet below. A rough stone wall about three feet high separates the road from this sudden precipice.

The road is heavily shaded, excessively muddy, and, I believe, always wet. I have driven the road frequently in past years and do not remember ever having seen it dry. I was extremely thankful for having with me a large acetylene searchlight which lit up the road, though the darkness was intense and the road of black mud.

I was held up for some time trying to pass a team which we met near a narrow bridge. After much maneuvering, we finally passed each other safely, though it was a very close shave. A few days ago an automobile crashed through the edge of this bridge and fell to the railroad track thirty feet below, severely injuring the occupants.

After passing through the Water Gap we kept on our way to Stroudsburg, which was to be our stopping place. We passed a camp of gypsies, and as the road seemed strange, not having seen it for several years, I asked them for road directions. I was refused information unless I had my fortune told. As we had no confidence in our fortune for that day, we hastened on and reached our destination, after having had to tighten the high-speed clutch. Tired and covered with mud of variegated hue, and with mud and grit covering the entire machine, we rolled into town with a great flourish at 8.30 P. M., having been on the road about twelve hours.

The only inconvenience felt the next day was an unpleasant stiffness and soreness of the back muscles resulting from the frequent involuntary duckings or obeisance due to the "thank-you-ma'ams."

The road from Stroudsburg along the Milford Pike to Bushkill, Dingman's Ferry, Milford and Port Jervis is very good, especially so from Bushkill to Port Jervis. The road is of shale, and practically keeps itself in fine shape, as it traces its way along the foot of the mountains of rotten shale rock.

DELAWARE WATER GAP FROM THE RAILROAD.

There are no great hills either, and the only danger is the temptation to ride too fast.

THE RETURN.

After spending several days visiting friends, relatives and places of interest in this vicinity, preparations were made for the journey home. I was told of the advantages of the level road through Wind Gap and of its superior character. We started about eight o'clock in the morning and passed rapidly through the western end of Stroudsburg, entering upon the road marked "To Stormsville." This road leads to the exquisite Cherry Valley and is in fair condition. We turned off at Norton Mansion to the right fork, which road is more level than the other, but was very muddy through the thickly wooded sections. The scenery to Saylorsburg and the Wind Gap is grand and inspiring, the air being pine-laden and very refreshing. The view at times is very extensive, showing a very fertile and attractive country.

Near Saylorsburg we pass Saylors Lake, a large and beautiful body of water, the woods surrounding which are used as a picnic ground. The Wind Gap is simply a pass or break in the Blue Mountain range, and has nothing of particular interest. Shortly after passing through the Wind Gap, we notice the trolley line coming from Bangor, following our road to Easton or Bethlehem and Allentown. To our great delight, we suddenly came upon a finely macadamized section of road and made good time as we passed through Nazareth, a very pretty town which has quite a suburban appearance. From Nazareth to Easton is but ten miles. The road varies from fair to very good, and brings the wayfarer to Chestnut Hill and College Hill, from which a rather sharp descent carried us to the street leading directly to the bridge crossing the Lehigh River. Immediately upon crossing the bridge the Delaware River road to the left was found, which we followed on our way up.

OLD HOTEL ON RIVER ROAD BELOW EASTON.

We followed the river road back to Kintnersville, where, after crossing the covered bridge, we turned to the right and found the direct road to Ottsville, Plumsteadville, Doylestown and Philadelphia. This road is much better to travel in wet weather, though the dreadful "thank-you-ma'ams" are too numerous to mention.

CAUSE OF A LOOSE CHAIN.

Though we rode very carefully, the rebound from one of these caused the shackles of the rear spring to turn completely. The resulting looseness of the chain caused us considerable mystification until the cause was found. This was the only mishap that occurred on our return journey, completed in seven hours and a half, including stops.

The price of gasoline paid varied from eleven cents in Philadelphia to twenty cents in Stroudsburg. I do not know whether the price increases with the altitude or with the latitude, as we were always in nearly the same longitude.

At a stopping place in the country, an elderly gentleman came out of his cottage and peeped from behind a tree at the machine while we were fixing the springs. After several minutes he ventured to put his whole head away from the tree, a little at a time, meanwhile keeping his body well covered, and asked with much concern, "Do you think I am perfectly safe to stand here? I am deathly afraid of them things." I assured him that he was safe.

INITIATING A HORSE DOCTOR.

At another place the horse doctor of the town was discussing his antipathy for automobiles, when I persuaded him to try a little ride with me. He consented to do so only when another horseman promised to accompany us. I rode slowly first, but gradually increased the speed; he immediately cried out, "Mister, let me out, let me out. You will kill us!" His companion held him in while I increased the speed. When he saw that his death was postponed, he took an interest in things, though he could not resist calling out, "Look out, mister, there is a wagon in front of you," while we were still one block away from the vehicle, fearing that I could not turn out of the way to avoid a collision. After a ride he voted that "them dem things beats horses every time," and he ceased to wonder why people delighted in their use. Thus were two converts easily made.

Altogether the trip was very enjoyable, but would recommend that this journey be made in a dry season, unless mud is no objection. I have also been convinced that there has been a very substantial progress in the art of automobile building, though I would like to suggest that more attention be paid to the construction of brakes. On machines such as mine, the reverse clutch is the only brake that will really stop the machine, and I shudder to think of the possibility of breaking a chain on a steep hill. If possible, I shall have this state of affairs altered as soon as I can. The brake is a double band leather lined, on the transmission, and simply lets the machine glide ahead.

VIEW NEAR MILFORD ROAD, FIVE MILES ABOVE STROUDSBURG.

STRETCH OF FINE ROAD NEAR RIEGELSVILLE.

LESSONS of THE ROAD

Eighteen Months' Experience With a Gasoline Car.

By Dr. C. P. Botsford.

After two years' experience with a steam runabout, in February, 1903, I purchased a 1902 model of a popular air-cooled gasoline car having a horizontal single-cylinder engine of about 8 h. p. The car had not had excessive use at the hands of its previous owner, and was in very good condition.

Naturally, the control of the car was different from the steamer, but it was such a relief not to have to watch the water-glass and to be always able to go up a hill, no matter how long, without letting the car stop to catch its breath, that I was very willing to rate gasoline as a great improvement over steam. It is a satisfaction to be able to leave the car to make a call, knowing that there was no pilot light to blow out and that there were no enticing cocks for the children to disturb. In fact, it seems to me that as long as the children can find a horn to blow there is not much danger of their disturbing the rest of the car.

Of course, I have had troubles, some of my own making and some for which I was not altogether responsible. For the first two months I got along very well, and then, when going slowly along a level stretch, the rear axle broke. I felt the car settling at the rear, and shut off the power and applied the brake about as soon as the broken ends touched the ground. Although this is a weak point in the 1902 model of this car, there was further cause in this case, as one of the ball-bearings had got out of adjustment at some time and had cut a slight groove in the live axle itself. Since then care has been taken to see that the bearing is in good condition and I do not expect a repetition of the accident.

PECULIAR CAUSE OF KNOCK.

No more troubles of a serious nature appeared till August. Then the car gradually developed a peculiar knock. It seemed to be around the main shaft, either in the balance-wheel or in the transmission gear, and the strange thing about it was that it was not constant. Sometimes the car would run several days without a sign of trouble, and then it would begin to pound as if everything was coming away. The balance-wheel did not seem to be loose, and I was at a loss to find the cause. The fact that it was not constant made me think that it might be due to a dry bearing, but the lubrication seemed good, so that had to be dismissed. As the car is made about twenty-five miles from my home, it seemed better to take it to the factory than let the local repair men try the job, so I ran it up one morning. It went beautifully for the first part of the way and I was tempted to turn back home again. Just then a short stretch of deep sand was encountered that made the motor labor a little, and all at once the knock began again worse than ever before, and for the rest of the trip I was almost ashamed to be seen in a car that made so much noise.

I had telephoned the factory that I was coming, and the men in the repair department set to work at once. Nothing was found out of the way until the main shaft came out. This has three-inch bearings with bronze bushings on either side of the cranks. The bearing part of the shaft between the crank and the balance-wheel had a crack extending obliquely about half-way through it. As this was entirely within the bearing, it had not given way and at times would fall into line so that the engine would run smoothly till a strain at just the right angle would throw it out as far as the play in the box would permit.

WINTER EXPERIENCE.

With the coming of snow I was at a loss for a satisfactory method of preventing the slipping of the driving wheels. Ropes and chains had been tried in previous winters; both did the work, but the former wore out quickly and the latter cut the tries unless often changed. Finally I saw in the Horseless Age the suggestion to use pieces of old garden hose threaded with rope and tied around the tire and felloe. Having no old garden hose at hand I took some pieces from an old outer tire about 3 inches wide, punched holes along the edge and laced these around the tire in much the same way that the rawhide patches for covering cuts are applied. Four or five of these pieces were laced to each wheel. The result was entirely satisfactory. As the patches lay flat on the tire, no inequality was felt in running over a smooth pavement, and as soon as the wheel began to slip the front edge of the canvas patch rolled up and took a firm grip on the snow. We had sleighing for two months, and the car was in use practically all the time for professional work, covering about 800 miles during January and February. One set of patches lasted me the entire season, and the tires beneath were not in the least damaged.

The car is kept in a cold barn, and on a number of mornings the oil was solid in the lubricator. I had the opportunity of observing that the oil I was using solidified at 10°F. It was convenient on cold mornings to set the engine running for a short time on first going to the barn, then shut it down while looking over the car and getting ready for the day's work. By the time the car was ready to start from the barn the heat from the engine had warmed the oil so that it was flowing freely. Very little more trouble was experienced in starting the engine on the coldest days than in summer. Of course, it turned over harder and took a little more muscle in that way. On several occasions after late night calls the carriage has been covered with frost, and yet the motor started the first time. On the whole, the car proved more satisfactory than any other means of doing my professional work throughout the winter. The time taken in going from one case to another is so much reduced that one does not get chilled, and on the occasions that I tried a sleigh, I was glad to get back to the easy riding automobile.

EXPERIMENTS.

I have spent quite a little spare time and obtained much pleasure in trying to improve the car. Most of my attempts have of course been failures, but a few seemed good enough for continued trial, and may prove of interest. At first the greatest trouble I had was with the splash of mud and water covering the low hung engine. The spatter guards on the inside of the front wheels which the makers furnish did not seem entirely satisfactory when driving in a heavy rain. After several trials I built a solid pan of galvanized iron, extending from the front axle back of the engine and transmission. This was open at the front and rear, and closed at the sides. Contrary to expectations, it does not rattle, and as it is supported at but five points, can be easily detached if it is necessary to get at the engine from below. The metal is easily cleaned, and does not become saturated with oil as a canvas boot does.

The forced draught for cooling the engine is supplied by a fan driven by a belt from the half speed shaft. In order to get sufficient speed, the pulley on the fan is very small, and there is some difficulty in keeping the belt from slipping unless it is set up very tightly. A leather face on the fan pulley seems to obviate the difficulty, so that the belt can be fairly loose and still not slip.

THROTTLE ARRANGEMENT.

The makers of the car think that they secure the best results by coupling the spark and throttle together. This method certainly works all right on good and fairly level roads. In heavy sand or mud it seemed unsatisfactory to me, as it is either necessary to take such a piece of road at an unduly high rate of speed or fall back on the low gear. I arranged a throttle on the operating post that gave very satisfactory results for the roads I have to travel. A few months ago, while comparing experiences with a brother practitioner who owns a car of the same make, he told me that he had his throttle arranged to work by a sliding rod in the footboard which he could easily operate with his toe. I adopted his suggestion, and find it much better than the hand operated throttle; better, also, than the pedal that is generally used, as the foot rests at ease on the footboard, and a slight lateral swing serves to open the throttle, which is closed by a

Since putting this on, stretches of hat always called for low gear be- have been repeatedly taken without on the direct drive. The noise of haust in the muffler, which has al- been quite prominent, is now very reduced under ordinary conditions, e muffler itself does not get nearly as formerly.

USE OF KEROSENE.

summer I have been experiment- ith mixtures of kerosene and gaso- proportions up to one of kerosene of gasoline. I do not detect any difference in the running of the car used continuously. There is the teristic odor of kerosene in the ex- however. In using the mixture in ork, where stops are frequent and rottle is nearly closed most of the there is a decided deposit of carbon combustion chamber. It is some- however, to know that a fairly large tion of kerosene can be used in an ency.

the eighteen months that I have the car it has run about 9,000 miles, ith the exception of the broken axle, lways come home under its own On two occasions only has there rouble from overheating the motor. rst resulted from attempting to take een-mile stretch of clay mud with no tion to the engine. The radiating ere buried out of sight in the mud, had to stop quite often to let the cool. The second time was on a er heavy roads requiring low speed of the way, with a strong gale blow- rom behind. This so thoroughly me the draft from the fan that when g to cool off the fan blades in front engine were as hot as comfortable e hand. As soon as the direction of ind changed the engine cooled off , although the heavy going still con- Both of these were unusual con- , and at other times there has been uble, and the car has proved in every fficient.

Through the Indian Country.

By L. L. Stine.

writer recently made a trip from ward to El Reno, Okla., and back in standard phaeton of Western manu- e. The roads, after the start from ward, were unworked and full of nd very often we encountered 20 per grades, which we made with ease, er. At Mutual, a little town thirty from Woodward, we took our break- oaded our machine up with three gal- f gasoline and some water and pro- again on our journey toward Seil- We encountered a number of horrible lls, which we managed to get over, rrived at Seiling for dinner. After on 2½ gallons of gasoline, and having watered our machine, we started for Contonment through the Indian allotments. The roads were simply cow-paths, until we arrived within a half mile of Cantonment, when the ruts over the old Fort Elliot trail became so deep that our rear axle almost struck, although it has seventeen inches road clearance. Here we were compelled to turn out of the road, take down a barbed wire fence and run into a pasture. Hearing a peculiar hissing noise, I stopped the machine and on examination found one of the inlet valve stems broken. Being within one-half mile of Cantonment, we ran into the town on one engine. In this place a fine, large Indian school is maintained by the Government for the education of the Cheyenne and Arapahoe Indians, and the entire country surrounding is inhabited by blanketed Indians. We inquired for a blacksmith shop, and when we arrived at the shop we were directed to, at about 4 o'clock P. M., we took out the inlet valve, which took about fifteen minutes, and assisted the Indian in preparing to weld it, which required about half an hour. In heating the stem he got the valve head into the fire, and it became coated with heavy scales. When the weld had been made, we found there was nothing to grind the valve in with, except some sand worn off an old grindstone. This, we found, served the purpose very nicely, and the entire job was completed in about an hour.

It began to drizzle, and as we were unfamiliar with the country and the roads were rough, we decided to stay for the night with a family one-sixteenth part Indian.

We awoke very early and proceeded on our trip about daybreak, encountering the worst road a white man ever undertook to travel. Everything worked nicely, however, and we arrived in Eagle City, fifteen miles from Cantonment, in time for breakfast, where we took on three gallons of gasoline and some water, oiled up, found everything in fine condition and went on through this miserable sandy country across ravines, canyons and washouts, until we came to Watonga, about twenty miles from Eagle City. Watonga has 15,000 inhabitans, 55 per cent. of which are negroes, and white people seemed ashamed of themselves for living there. We ate our dinner at a white hotel, however, got out of town as soon as possible and soon arrived at Geary, a little place of 10,000 inhabitants. Here we stopped and refreshed ourselves, examined and oiled our machine and resumed our journey on what we supposed to be the right road to El Reno. We got lost and had to retrace our steps to get back to Geary and on to the proper road, which we found to be very good.

It being then about 5 o'clock P. M., we moved along at the rate of about twenty miles an hour, everything going nicely until within four miles of Fort Reno, where we encountered deep mud. We proceeded on through Fort Reno, a distance, then of five miles from El Reno, where we arrived at about 7 o'clock P. M. Our wheels slipped so badly when we struck the mud that our odometer registered 75 miles from Geary, when we had actually traveled 20 miles. We stopped at the Hotel Kerfoot, put our machine into a livery stable and had the same washed off and inspected it. Found everything in fine working condition. It started to rain and continued for two days, holding us in El Reno, a very pretty place of about 5,000 inhabitants. Here they have several factories, a large cotton gin and many nice homes, and about eight or ten automobiles, including some French machines.

After the rain we started on our homeward journey, expecting to take a different route home, but were sadly disappointed. Having ascertained by telephone that all streams and rivers were up, and knowing these dangerous quicksand streams, we decided to travel the same road back, which we did in about twelve hours' running time. Had no trouble whatever, except that some poor patches on our inner tubes came loose, but these were repaired in about fifteen minutes' time.

Automobiling in Missouri

By P. T. Cross.

Although I possessed but a few days experience in handling our new runabout, my wife considered my knowledge of the vehicle sufficient to undertake a tour of about a hundred miles to the Missouri River. The night before I gave the car a careful inspection and put everything in readiness for an early start on the morrow. We were up with the sun the next morning and were soon speeding away over the smooth, level roads that are to be found in many portions of northwestern Missouri. The motor was doing splendid work, and at the end of the first hour on the road we had covered a distance of twenty-two miles. This was quite gratifying to me, as it was the first time that I had ever tested the speed of the car on anything like a long stretch, and I am confident that as I become more experienced in handling the car and the parts of the motor wear smooth, I can easily reach the rate of speed claimed by the makers—thirty miles an hour.

After passing the little town of Liberty, we headed direct for the Missouri River, aiming to cross that stream at Kansas City. A particularly fine stretch of road lay before us, and we were going at a lively speed when suddenly I became aware that something was wrong. The car slowed down and in a few yards came to a stop of its own accord. I proceeded to make a search of all parts, but could find nothing that looked to a novice like it was out of fix. I cranked the engine vigorously but could get no explosion. I then told my wife that I was

certain that the trouble was with the carburetor, and I proceeded to dissect that worthy. While I was doing so Mrs. C. started in for a little examination on her own hook, and in a few minutes she gave vent to a little cry of surprise. I looked up and saw her standing by the gasoline tank with the top in her hands, and instantly it flashed into my mind that I had forgotten to fill the tank the night before. Sure enough, the tank was empty, and the engine had stopped for want of fuel. Luckily, there was a farmhouse near by with telephonic communication with the town we had just passed, and in less than an hour we had obtained a quantity of gasoline, refilled the tank and were all ready to proceed. The engine started in perfect order, and I breathed a sigh of relief when I saw that the motor "was doing its work."

In this part of the country an automobile is a real curiosity, and not more than one in a thousand of the rural inhabitants have ever seen a "devil-wagon." It was quite amusing to see how some of the native Missourians regarded our wagon. At one farmhouse where we stopped to inquire the way, two girls, both fine types of rustic beauty, were lounging under the shade of a tall oak, but came forward and gazed at the auto with great interest. One of the girls remarked that she would like to ride in a thing "like that." Whereupon my gallantry prompted me to suggest to my wife that she alight and permit me to take the young lady a short ride in the auto. After a half-hour's drive over a good road I drew up in front of the farmhouse again and the young lady, her face aglow with the excitement engendered by the swift ride and the light of enthusiasm in her eyes, alighted.

In the meantime, my wife had gotten on so well with her new acquaintances as to have received, and accepted, an urgent invitation to partake of the noonday meal with these gentle rural folk; and after a repast of "country ham" and "spring chicken," the taste of which still lingers with me, we were again upon the road. Now our way led through the dense timber lands of the Missouri River bottoms. Great oaks and sycamores arose to such a height on either side of the narrow roadway that for several miles the sun was entirely hid from our view, and in many places the low overhanging branches came in harmless collision with us as we passed by. We were now on the banks of a good-sized creek, called Fishing River, and the only means of crossing was by fording, there being no bridge. The creek was about thirty feet wide and the water looked deep. I was a little undecided whether I should tackle this or not. But I determined that an automobile, to be worth anything, "must go the route," so I plunged in. The water rose to the hubs, then to the bottom of the car before we were half-way across. But the bottom of the creek was firm, and the tires took good hold, and in a few seconds we emerged on the other side, the faithful engine working as fine as ever.

Thirty minutes more and we were crossing the Missouri over the Hannibal Railway bridge and arrived at Kansas City. Here we were destined to suffer the only mishap of the whole trip, and that was to the occupants, not to the runabout. The old saying is that "pride goes before a fall," and in my case it was surely true. As we emerged on to the broad, level pavements of the city streets, I felt a conscious pride in my new possession, and I determined to see "what she could do." I pressed the accelerator and the car shot forward. Going at full tilt we arrived at a corner where we were to turn eastward. I had often read of "skidding," and had some vague and indistinct idea as to what it meant; but recollection had deserted me. I gave the steering wheel a turn to cut the corner and really tried to check the speed, but I became "mixed" in my actions and instead of checking the car I threw on more speed. The car skidded across the street at a frightful pace and brought up with tremendous force against a light delivery wagon. My wife and I were thrown from the car, she sustaining a sprain of the ankle and I a few bruises.

After an hour's rest we began the return home, and I was very careful to do no scorching until I had put the waters of the Missouri betwen me and the Blue Coats of Kansas City. I no longer tried to "cut the corners" with an air of smartness, but crept around them at a slower but safer gait. Near the little village of Robertson we met some cattle browsing along the roadside. They raised their heads and gazed at us as we passed by and then one of them, as if incensed at the brilliant red of our auto, gave chase. I was a little nervous and Mrs. C. was positively frightened. But the runabout, by virtue of superior speed, soon left the angry bovine in the distance. From Liberty we took a different route from the one we had come, and it led us by the historic home of the once notorious bandits, the James boys. The rambling three-room house stood back from the road, and the little graveyard where the body of Jesse James was interred can be seen in the distance at the rear of the house. This is a Mecca for sightseers and the curious. We resolved to make a trip to this place at some future date, and passed on. As we passed a farmhouse a belligerent dog came lunging in front of our car. The wheel passed over him, and while it did not hurt the dog it almost upset the auto, and for the first time I learned that it was dangerous to run over even a canine.

At ten minutes after nine, at night, we arrived safely at home. We had made the trip, covering about 125 miles, without a single mishap to the car. Never once did it stop of its own accord, except for want of gasoline. All its machinery worked perfectly, and it is certainly built to stand wear and tear.

New Vehicles and Parts

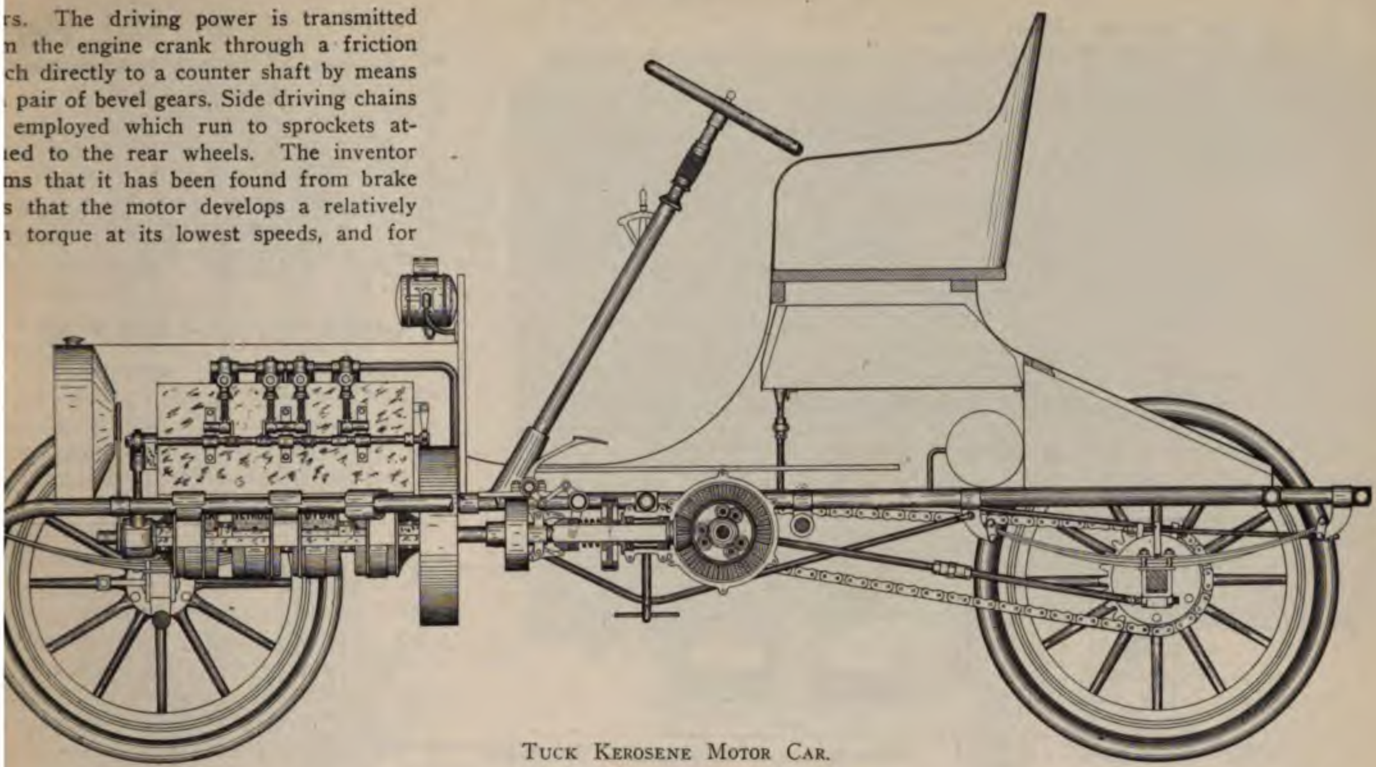
A New Kerosene Car.

The Tuck Petroleum Motor Company, of 58 Schermerhorn street, Brooklyn, N. Y., have in process of construction a car which embodies some very novel ideas, and of which much is expected by the manufacturers. The first interesting feature is that the motor derives its power from kerosene oil, and departs in its general design from common practice in petroleum engine construction, in that no attempt is made to vaporize the oil before it is admitted to the cylinder. A small pump, driven from the engine crank by means of gears, draws the fuel oil from the source of supply and forces it through a mechanically actuated injector valve into the expansion chamber. An air valve, also mechanically operated, is situated on the opposite side of the cylinder, next the exhaust valve. The oil and air, therefore, pass into the cylinder through separate pipes. The governor works on the oil pump, varying the length of its stroke and thereby increasing or decreasing the amount of fuel fed to the cylinder, and also varies the amount of air which passes in through the air valve. The speed of the motor is entirely regulated in this way, and shows a marked flexibility. Jump spark ignition is used at the start and for running until the priming parts within the expansion chamber become incandescent, when the current is cut off and the motor becomes self-igniting.

The engine which is being fitted to the car under construction is of the four-cylinder type, resembling in general appearance the ordinary gasoline motor. It has cylinders 2½ inches in diameter, a stroke of 3 inches, and is expected by the inventor to give 12 horse-power at 600 r.p.m., and to have a maximum speed of 3,000 r.p.m. The cylinders are water jacketed, the cooling fluid being forced through the jackets and a honeycomb radiator by means of a pump. The exhaust from two of the cylinders is used to create a pressure of about 100 pounds within a small cylindrical tank located beneath the seat of the car. The pressure so accumulated is to be used to give the motor its starting impulses, and thereby to do away with cranking. A valve controlled from the operator's seat permits this pressure to pass within the cylinders under the action of the valves, and at the same time the electric circuit is completed and the oil feeding mechanism put into action. As soon as the motor becomes self-igniting the pressure and spark are cut off. The capacity of the tank is sufficient to keep the motor turning for a period of about two minutes, and, it is claimed, provides a large surplus of power over that necessary to effect satisfactory starting.

The most remarkable feature in connection with the design of the other parts of the car is the absence of any change speed

rs. The driving power is transmitted n the engine crank through a friction ch directly to a counter shaft by means pair of bevel gears. Side driving chains employed which run to sprockets at- ied to the rear wheels. The inventor ms that it has been found from brake s that the motor develops a relatively torque at its lowest speeds, and for



Tuck Kerosene Motor Car.

reason he is able to do away with the or starting gear which is necessary h an explosion engine because of its de- dence upon speed to produce power. torque curve, he says, resembles that he steam engine more than that of the losion engine. The car, as a whole, will of comparatively light weight, and for reason, and because of the high pres- carried in the pressure tank, it will be sible, according to the belief of the de- ier, to start the car as soon as the pres- is admitted to the cylinder. The clutch ld therefore be of use only in effecting uick stop. In which case the driving er would be immediately cut off and brakes applied, as is the case in the idard gasoline propelled cars of to-day. nother interesting point is that no rsing gear is provided, the reversing ration being effected by reversing the ine, as in steam-driven cars. To do this s of course first necessary to stop the or. By means of a lever the valve- ng cams are shifted in such a manner the opening and closing of the valves imed so that the direction of rotation be changed. After the valve cams have n shifted the starting is effected by ns of the pressure supply in the manner ribed above.

utside of the features already men- ed, which differ from the general run ractice, there is nothing in the general gn of the car as a whole which departs n the conventional. The engine is placed ically in front of the dash under a hood. has splash lubrication. Dry batteries used to supply the electrical energy for sparking system, and the details of the ing device are worked out in accordance with present practice in gasoline engine construction.

The supporting brackets of the engine are bolted directly to the main frame, which is constructed of steel tubes and truss rods. Wheel steering is fitted, and the controlling levers are located on the steering column.

Lunkenheimer Mechanical Lubricator.

The Lunkenheimer Co., of Cincinnati, O., have recently brought out a mechanical multiple lubricator for automobiles, which is herewith illustrated. The tank and its lid are made of aluminum, and all the working parts of the apparatus are either of hardened tool steel or of a hard grade of bronze. As it is desirable to use a heavier grade of oil for the crank pin and main shaft bearings than for the cylinders, the tank of the lubricator is divided into two compartments, for feeding different grades of oil. In Fig. 1 herewith the compartment for the heavy oil, which is the smaller of th. two, is shown at the right, while the compartment for the cylinder oil is shown at the left. The latter contains all the mechanism for feeding the oil to the four cylinders of the car, and to the clutch sleeve. The oil contained in the smaller compartment is fed by means of a hand pump N with the usual ball check valves, through the delivery O to the crank case of the engine. A gauge glass P is provided for each compartment, that for the smaller compartment being shown in the drawing. It will be noticed that the glass is surrounded by a brass shield, and that it can be shut off from communication with the tank by means of a needle valve Q. The large compartment has a capacity of one quart, while the small compartment holds a pint. Both compartments are provided with filling caps in the lid of the tank and strainers are placed underneath each opening.

The method of feeding oil to the cylinders and clutch sleeve bearing is as follows: By means of an oil pump inside the main oil compartment, oil is pumped to a sort of trough W in front of the main compartment, separated from the latter by a partition wall. Into the bottom of this trough are screwed five oil drips L, which may be shut off by nedle valves R controlled by snap handles S. The drips L are surounded by short glass tubes T, thus forming sight feeds. Each of these sight feeds forms the suction or inlet passage of one of five oil pumps located within the main compartment and operated by the same mechanism as the pump supplying oil to the trough W.

The mechanism for pumping oil to each of the four cylinders and the clutch sleeve is as follows: A shaft D extending through the rear wall of the casing is supported in journals in bosses formed on the latter. The rear bearing is provided with a stuffing box U, to prevent any oil working out through this bearing. The shaft is steadied by a bracket V with a half-bearing, screwed to the lid, and carries at its outer end a grooved pulley or sprocket wheel C, by means of which it may be driven from the engine crank shaft. The shaft D is cut with a worm which meshes with a worm wheel E on the shaft F. The latter carries two sets of double cams G, co-operating with the yoke H. To this yoke are secured pump plungers I, J and K. As there are two yokes H, there are, consequently, six pumps

in all. Of these, the one farthest to the left, in which the plunger J works, pumps oil from the main compartment into the trough W. As this pump has to pass the same amount of oil as all the others com-

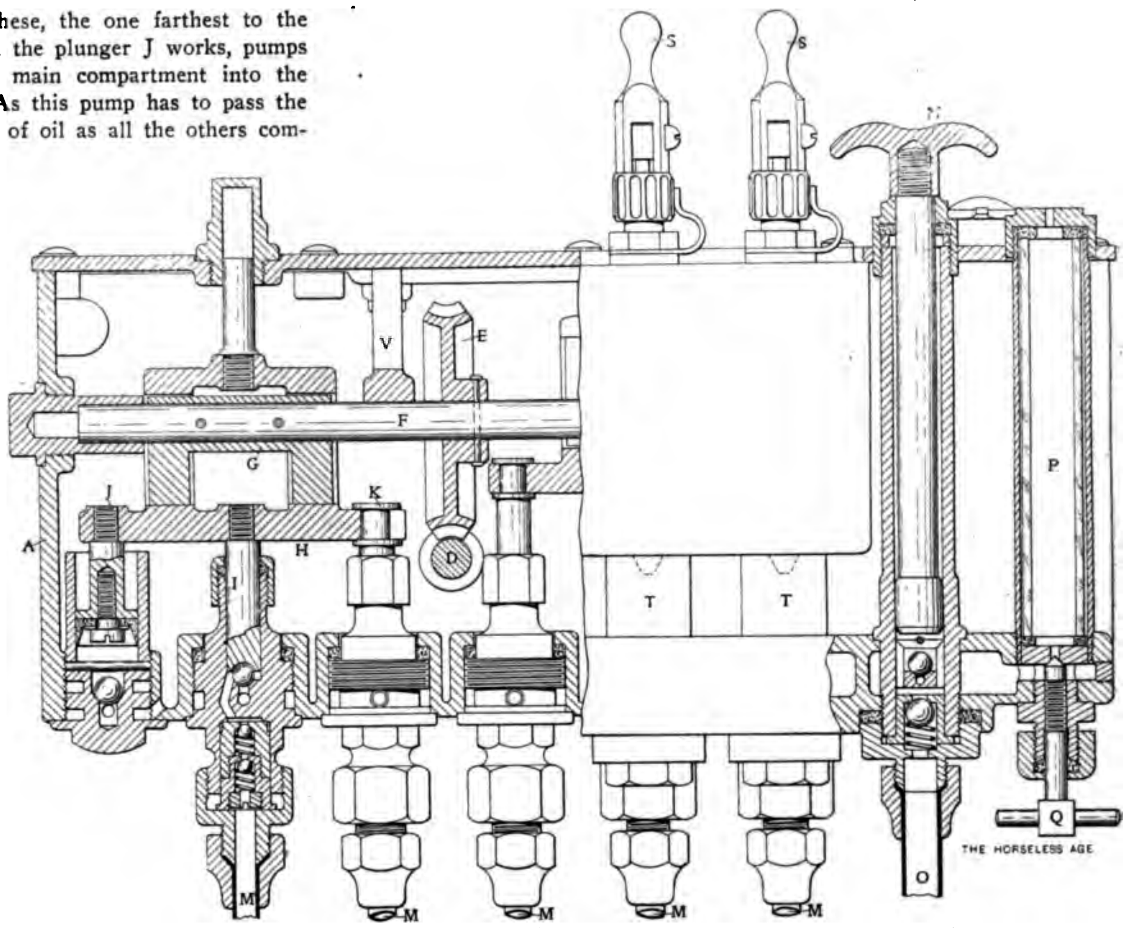
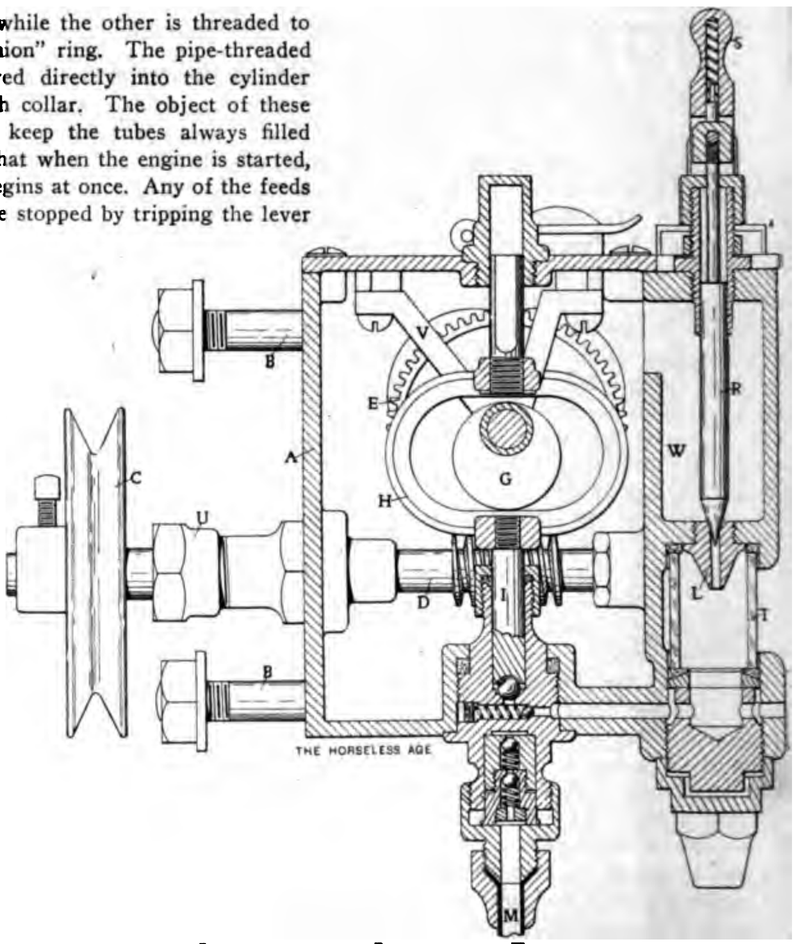


Fig. 1.

bined, and has the same length of stroke, it is made with a considerably larger bore of barrel. It also has a leather washer piston, like bicycle air pumps, instead of a plain cylindrical plunger like the others. It will be noticed that all the pump barrels are screwed into the oil tank from below, being duly packed to prevent leakage of oil. Each pump has ball suction and delivery valves, as shown. The delivery connection from the main pump to the trough W is not shown in either drawing.

In Fig. 2 may be seen a section through one of the five force feed pumps supplying oil to the different cylinders and the clutch sleeve. The suction connection with the sight feed tube T is clearly shown. When the plunger I is raised, oil is drawn into the cylinder in which this plunger works, through a small spring-pressed ball check valve and a free ball valve at the botom of the cylinder. When the plunger begins its downward stroke, these two check valves close, the first under the action of its spring and the second under the action of gravity, and the oil is forced from the cylinder through a zig-zag passage leading around the inlet passage (as seen in Fig. 1), past two spring-pressed ball check valves into the feed tube M. The object of the last two ball checks is to prevent oil being sucked back into the pump during the next suction stroke. An angle check valve is placed at the end of the five automatic feed pipes. One end of this check has a ¼" pipe thread, while the other is threaded to receive a "union" ring. The pipe-threaded end is screwed directly into the cylinder wall or clutch collar. The object of these checks is to keep the tubes always filled with oil, so that when the engine is started, lubrication begins at once. Any of the feeds can readily be stopped by tripping the lever



Lunkenheimer Lubricator, Fig. 2.

S, and adjustments of the feed can be made by turning the cap V, a left-handed rotation increasing the feed and a right-handed rotation reducing it.

The hand pump N is used to replenish the oil in the engine crank case from time to time and it has been found that eight or ten strokes every 25 minutes give a sufficient oil supply.

New McCord Force Feed Lubricator.

The cut herewith shows the new force feed lubricator manufactured by McCord & Co., Chicago, which has several advantages and improvements over the old McCanna, although retaining its best features.

The lubricator consists of a rectangular metal case, T, with a bolted-on cover, U. The coverplate, U, is provided with a filling opening closed by plug, P, and the oil when poured into the tank, T, must pass through a perforated sheet metal strainer, Q, which prevents any solid particles getting into the tank. The force feed mechanism consists really of two pumps, the barrels or cylinders of which are indicated by C and D. respectively. The stroke of the plunger, L, working in pump barrel, D, can be adjusted from the top of the lubricator without removing the cover. The second pump has a constant stroke, and forces the oil after it has dropped through the sight feed glasses, R, on to the point of lubrication. These sight feed glasses are simply a protecting case for the oil drops, and do not contain any liquid, which is claimed to have proved a great disadvantage in the liquid sight feed glasses. The amount of oil being pumped is at all times visible to the operator. The operation is as follows:

The pumps are driven by an eccentric, B, and adjustable lever, E, by means of a worm gear, W, connected to the cam shaft or other rotating part of the engine by the pulley or sprocket, O. The stroke of the supply pump, L, is increased or diminished (thus increasing or diminishing the amount of oil pumped) by means of the sliding arm, F, which forms a movable fulcrum for the pump lever, E. When the regulation stem, K, is screwed down the fulcrum is raised and the stroke of the pump piston is lengthened. Lowering the fulcrum decreases the stroke of the pump piston and diminishes the amount of oil pumped. This pump delivers the oil through the oil standpipe, H, from which it drops to the delivery pump, G, attached to the jaws of the operating lever. The stroke of this pump is constant, and every drop of oil which falls into the pump chamber must be forced out through the delivery pipe, N, and on to the point of lubrication. In the drawing, S represents the suction nipple through which oil is drawn from the tank into the pumps; I, the outlet fitting for the force feed pump, C; V, a union ring to secure the oil tube, N, to this fitting; M, a flanged stuffing box gland for the oiler shaft, A, and J, a cap to hold the sight feed glass, R, in place. This lubrication is claimed to have the following advantages:

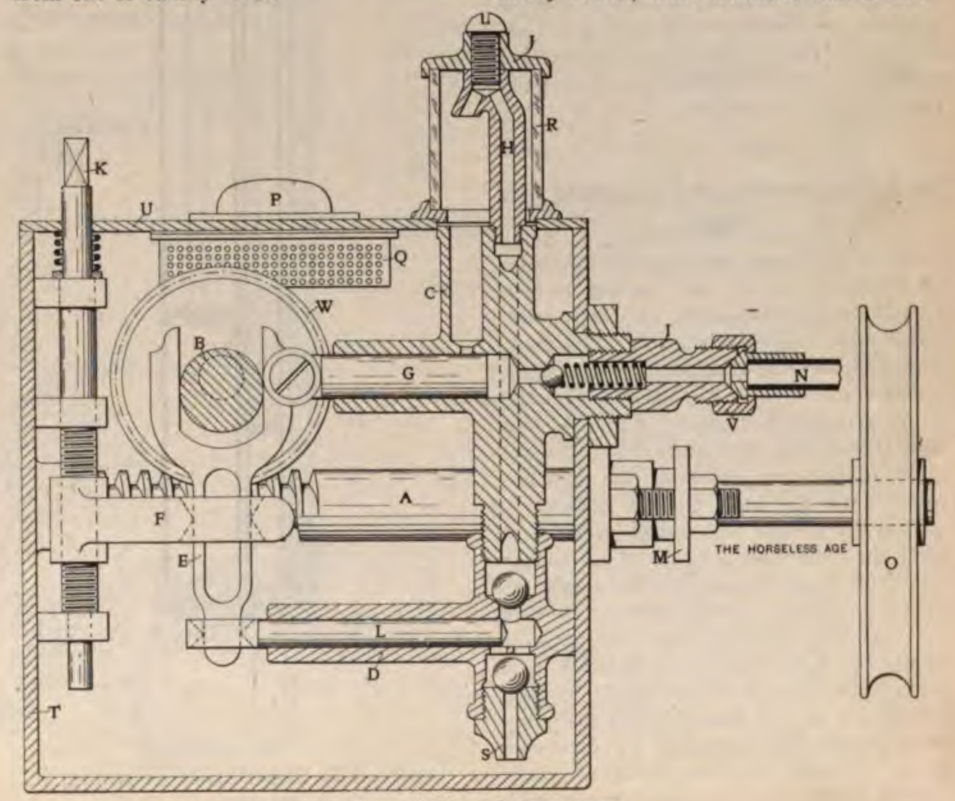
First, it insures lubrication in proportion to speed; second, it gives absolute and unfailing delivery of the amount of oil pumped to the bearings; third, the amount pumped is always in sight of the operator; fourth, there are no liquid sight feeds to become cloudy or freeze; fifth, the amount of oil is regulated from outside the lubricator without removing the covers; sixth, the height of the lubricator being so small, it can be placed well up on the dash in full view of the operator.

These lubricators are made in all sizes, from one to twenty feeds.

The Electric Detector.

The Electric Detector.

King & Zimerman, 508 E. Water street, Syracuse, N. Y., manufacture an electric testing device which can be attached to any spark coil, as shown in the illustration herewith. The device comprises a multiple electric switch, an air chamber and a pressure gauge. The air chamber, which is sealed and provided with a glass front, is located at the bottom of the device, and the pressure gauge is arranged at the center of the base. The base also carries five switch levers. The upper central one is a battery switch, while the other four are in-



The McCord Lubricator.

serted in the different secondary circuits and permit of connecting the secondaries either to their respective spark plugs or to the spark terminals in the air chamber. When the levers are in their lowest position they connect to the plugs, and when in their highest position they connect to the air chamber. There are four contact buttons for the upper central switch lever, each corresponding to one primary circuit.

To test the batteries the secondary switch levers are set to make connection with the air chamber, and the primary switch lever is then brought in contact with any of its four contact buttons. If batteries are strong, this will produce a large spark in the air chamber. In order to adjust the vibrators, the secondary switch levers are left where they are, and while the primary switch is set to close the circuit through any of the coils, the vibrator of that coil is adjusted until the proper size spark shows in the air chamber. The different vibrators can thus be adjusted in succession. It is understood, of course, that before these tests are begun, an air pressure is pumped up in the air chamber equal to the compression of the engine. This may be accomplished by coupling a tire pump to an air valve below the air chamber.

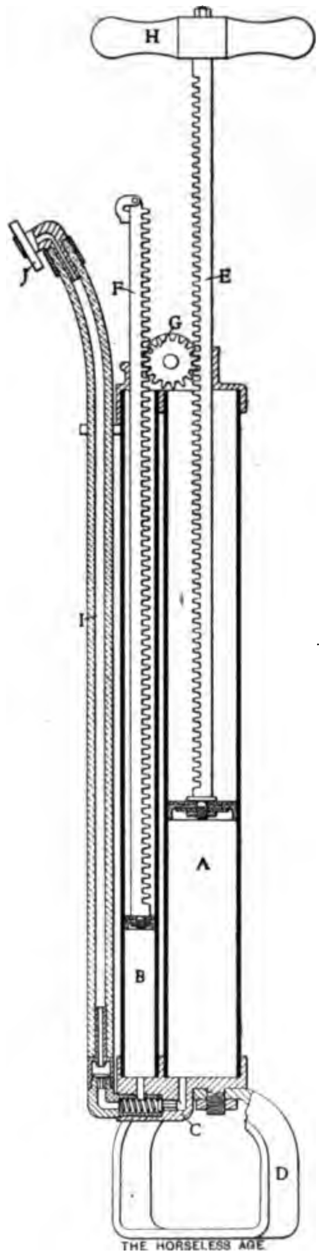
In order to test the primary circuits, including the commutator, the engine is turned over four times by hand, and at each half revolution a spark should appear in the air chamber; if it does not, it is a sign that there is a fault in the primary wiring or commutator.

To start the motor the secondary switches are set to establish the contact with the plugs. To test the plugs, any three of the four secondary switches are set to connect with the air chamber, and the engine will continue to run on one cylinder if the plug is all right. All four plugs can be tested in this manner in succession.

The Kellogg Double Acting Compound Tire Pump.

The Wray Pump and Register Company, of Rochester, N. Y., are making an improved tire inflating pump, of which a sectional view is shown herewith. The pump works on the compound, or two-stage compression principle, and is of the ordinary hand-operated "foot pump" type. A difficulty which has heretofore been encountered in tire pump design is that it is impossible to get both enough volume to quickly fill the tire and enough pressure to meet the requirements made of automobile tires. Of course, toward the end of the inflating process air can only be forced slowly into the tire, owing to the limitations of human strength, but when inflation first begins, and there is yet practically no back pressure, it is very desirable that the pump have considerable volume, as otherwise there is much needless waste of effort. These two requirements cannot be met with a single cylinder pump, as, supposing the tire has to be pumped up to 70 lbs. pressure per square inch, and the limit of the operator's pressure is 150 lbs., it follows that the piston cannot have over two inches of cross sectional area. It would require an immense amount of pumping with a piston of this size to fill, say, a 4-inch tire.

The Wray Pump and Register Company has solved the problem by providing two cylinders, for a two-stage compression process. Referring to the sectional view of the pump herewith, A is the low pressure cylinder and B the high pressure cylinder, these consisting of seamless metal tubes arranged parallel with each other and held in upper and lower fittings, C and C′. In these cylinders are adapted to reciprocate, air pump pistons of the familiar type, in which a leather cup is held between two metal washers. The two piston rods, E and F, are cut with rack teeth and are placed in driving connection with each other by means of the toothed pinion, G. To the upper end of the piston rod, E, is secured the operating handle, H, so that motion is given to the piston in the low speed cylinder directly, and to the piston in the high speed cylinder through the immediary of the two gear racks and the pinion G. To the end fitting, C, is secured a stirrup, D, into which the operator inserts his foot when pumping. The operation of the device is as follows:



KELLOGG DOUBLE ACTING COMPOUND AIR PUMP.

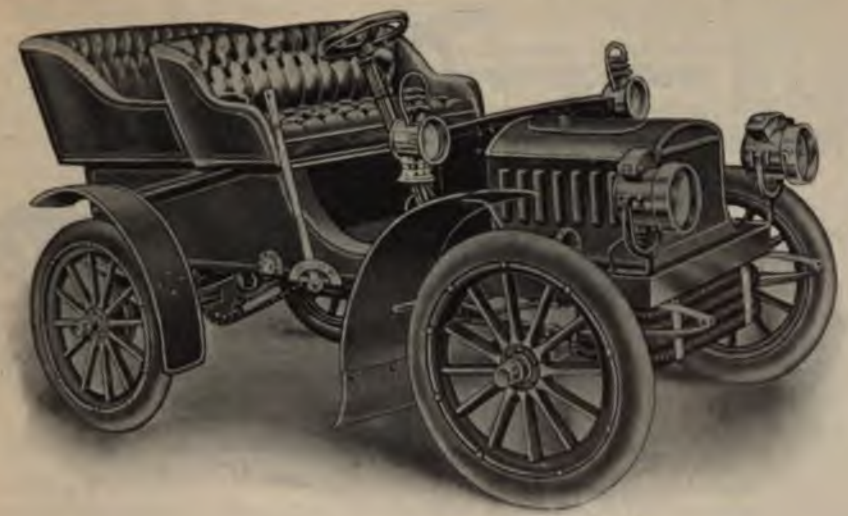
During the upward stroke of the handle, H, air is drawn into the low pressure pump cylinder, A, through the upper end fitting, C′, and past the leather cup piston. During the downward stroke this air is forced through a spring-pressed poppet valve in the end fitting, C, into the high pressure cylinder, B, the piston of which moves upward at the same time that the piston of A moves downward. At the end of the downward stroke of the low pressure piston the high pressure piston is at the end of its upward stroke, and the high pressure cylinder is filled with air at a certain pressure, depending upon the ratio of volumes of the low and high pressure cylinders. The poppet valve in the fitting C now closes under the action of its spring, and during the next (upward) stroke of the pump handle the high pressure piston moves down and forces the air contained in the high pressure cylinder past a gravity-operated check valve into the delivery tube, I, and through the connector, J, into the tire.

It will readily be understood that the maximum pressure obtainable with this pump depends upon the diameter of the high pressure cylinder, while the maximum volume capacity depends upon the diameter of the low pressure cylinder, so that by making the high pressure cylinder sufficiently small and the low pressure cylinder sufficiently large, both requirements of a good tire pump., viz., great pressure and great volume, may be satisfied. Besides, it is well known that there is a certain economy of effort in multiple-stage compression, the underlying principle being the same as that by which superior efficiency is secured by multiple expansion in steam engines.

The 1905 "Model" Cars.

The Model Gas Engine Works of Auburn, Ind., are building for the coming season a five-passenger car, weighing 1,600 lbs. and equipped with a 16-h.p. engine, and a four-passenger care weighing 1,200 lbs., and equipped with a 12-h.p. engine. Both of these cars have double cylinder opposed horizontal engines and sliding change-speed gears. The distinguishing feature of the new car is that the bodies are hinged at the back, which allows of raising them in an instant, to obtain access to the entire mechanism.

The main frame is constructed of angle steel, being formed from a single piece;



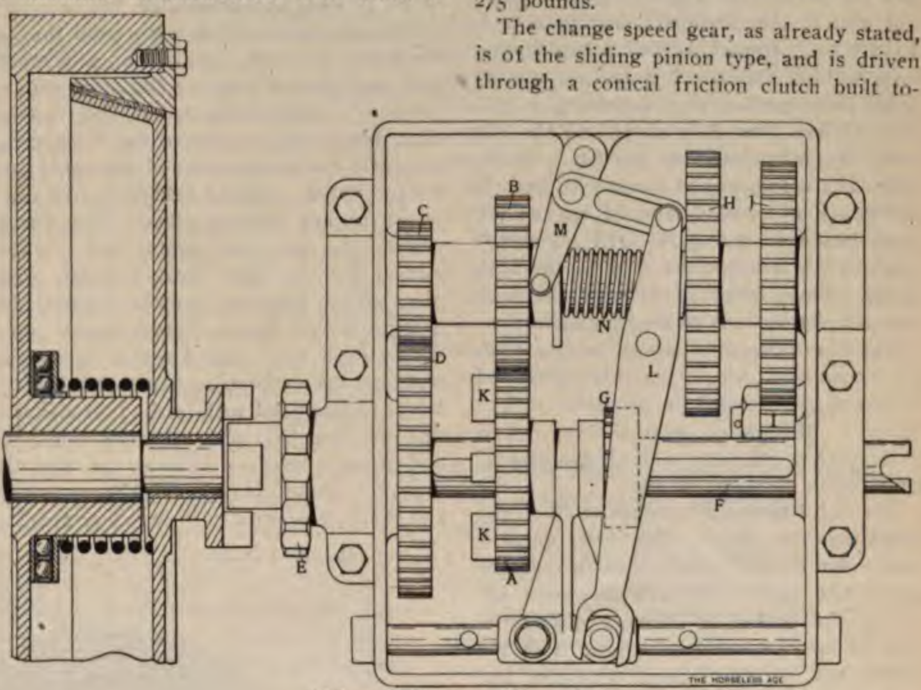
1905 "Model" Touring Car.

it is supported on semi-elliptic springs both in front and rear. The front axle is fitted with Timken roller bearings, and the rear axle with Hyatt roller bearings. The road wheels are of the artillery type, and purchasers are given a choice between 3" x 28", 3" x 30" and 3½" x 32" detachable tires. The wheel base of the car is 72 inches, and the tread 56 inches.

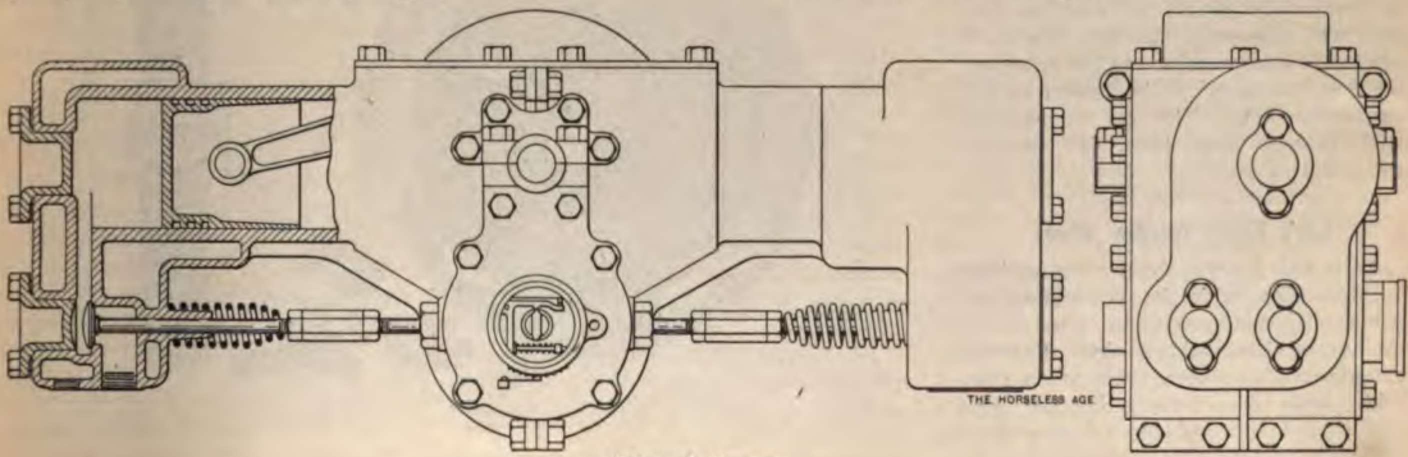
The 12-h.p. motor is of 4¼ inches bore and 5 inches stroke, and is rated to give its normal horse power at 1,000 r.p.m. Each engine is cast in a single piece, except the bearings and crank case cover. There are no separate cylinder heads, nor packed joints in the water space. The valve chamber is cast integral with the cylinders, and is completely surrounded by the water jacket. The coverings for the valve openings are cup-shaped plates with ball and socket joints. The carburetor and inlet pipes are 1¼ inches in diameter, while the inlet and exhaust valves are 1⅝ inches. The manufacturers think these valves to be unusually large, and give for their reason for making them so large that they need be lifted less from their seat, which tends to reduce the noise. All the valves are mechanically operated, the two inlet and the two exhaust valves being each operated by a single cam. The engine bearings are of brass, and are provided with means for taking up wear. The crank case cover is of aluminum, and the crank case itself is made oil tight and has a lubricator mounted above it to which it is connected through an automatic check, in order to use the compression in the crank chamber at the end of the outward stroke of the piston, for feeding the oil. The engine is so constructed that every separate working part, including the cam shaft, valves, crank shaft, pistons and connecting rods, can be removed without disturbing the cylinders. The pistons can also be removed without disturbing the crank shaft.

The ignition commutator is mounted on the cam shaft, and is completely inclosed, being provided with a screw cap. The speed of the engine is controlled by varying the time of ignition and by throttling the charge. Ignition is effected with current from dry cells, a double vibrator coil being used. The cooling system comprises a water tank and radiator, and a centrifugal pump driven by friction from the flywheel, the friction wheels being pressed in engagement by means of a spring, to insure uniform driving pressure. The water tank holds five gallons, and the gasoline tank eight gallons. The engine complete weighs 275 pounds.

The change speed gear, as already stated, is of the sliding pinion type, and is driven through a conical friction clutch built to-



"Model" Change Speed Gear.



"Model" Engine.

gether with the engine flywheel. The clutch drum rides on a reduced extension of the crank shaft, and is forced into engagement with the clutch ring by a strong coiled spring between the web of the flywheel and the web of the clutch drum. When the clutch is in engagement, all end thrust is self-contained, and when held out of engagement, it is taken up by a ball thrust bearing. The power is transmitted from the clutch to the change speed gear by means of a jaw coupling.

With one exception, all of the gears of the transmission are of steel and hardened. The exception is gear wheel J, which is of brass. In the drawing herewith, the change speed gear is shown in the position corresponding to the intermediate speed, the drive being from gear A to gear B and from gear C to gear D, sprocket E being rigidly attached to gear D, which is loosely mounted on the end of the shaft F.

For slow speed, sliding gear G is shifted to the right until it engages gear H. Then the drive is from G to H and from C to D. For the reverse speed, gear G is shifted still further to the right until it engages idle gear I; then the drive is from G to I, from I to J, from C to D. When driving on the high speed, all gears are out of mesh, the secondary shaft not being in motion. When gear A is shifted to the left until the jaw clutch K engages gear D, gear G is drawn out of mesh with gear D by means of levers L and M against the compression of spring N. The intermediate speed is a little over 50% of the high speed. Slow speed is 20% of the high speed, and reverse is 18% of high speed.

The top of the transmission case is made of aluminum. All levers are made of forgings. The clutch is provided with a brake so that when it is thrown out it stops, thus doing away with all grinding of gears when changing speeds.

The hub brakes are attached to the pedal operating the clutch, the first forward movement of the pedal throwing out the clutch and further forward movement applying the brake. A Warner differential gear is used. The steering gear is of the worm and sector pattern. Gasoline and water tanks are mounted under the hood in front. The weight of machine complete with tonneau is 1,200 lbs. The car is painted in maroon color and the upholstering is in full leather. The fenders are exceptionally large. The car is equipped with fenders, lamp, horn, and complete equipment of tools.

Borbein Pressed Steel Frame.

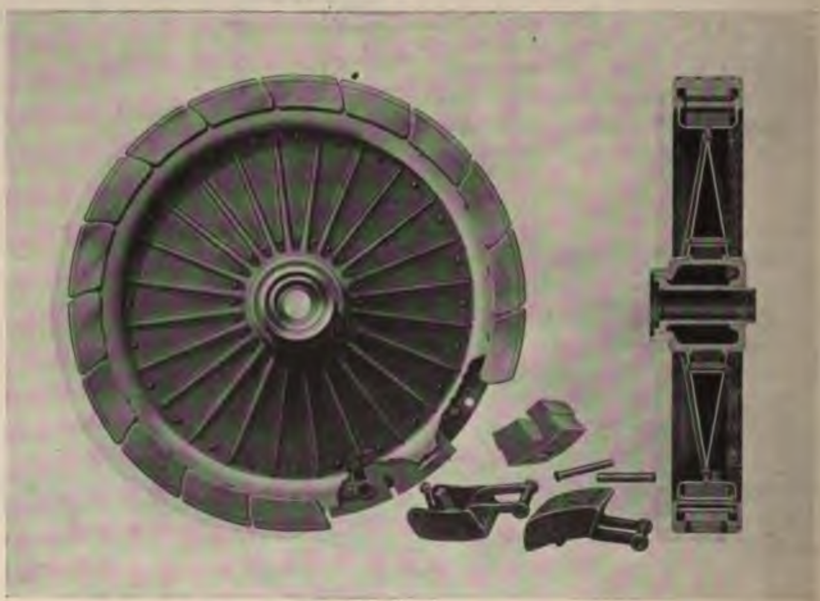
Lea's Heavy Traction Wheel.

As is well known, the greatest problem in connection with the development of commercial motor vehicles, especially of the heavier class, is that of tires. Repeated experiments have been made to do away with elastic tires entirely, but the great majority of such vehicles are now fitted with solid rubber tires. Considerable inventive effort is being expended at present to devise a tire that will stand the arduous service of heavy goods transportation, and one of the latest developments in this line we are able to illustrate herewith—a new design of heavy traction wheel, invented by E. S. Lea, of Trenton, N. J.

This wheel, as will be seen from the illustration herewith, consists of a pressed steel shell riveted together and fitted with a number of interlocking shoes. The tractive effort comes on the arms of the shoes, consequently the compression of the rubber is always radial, and the rubber is not subjected to any tearing effect. The shoes overlap the rim of the wheel, and are arranged with a slight break between each pair, which tends to prevent slipping in going over car tracks or other smooth surfaces. Each shoe is fitted with a removable plate on the outside, having a number of tapered holes filled with lead. It is claimed that the lead will pick up sand and grit, and thereby prevent slipping on smooth asphalt. These shoes are easily removed, and the cost of repairs is therefore small.

Each shoe is pivoted on a pin rivet securely through the rim of the wheel, a the hub of the shoe one each side re against a small square hardened plate, will be noticed from the cut. This jo is protected by a felt washer on each si and lubricated through the center with thin graphite lubricant, but as there w never be a play of more than 1/16th of inch on this pin, it is claimed that amount of wear amounts to practica nothing.

At the other end of the shoe there is guide passing down on the inside, and r eted to the center of the rim is a cor sponding guide. This is made to take c of the side thrust on the front end of sh so that turning corners will not put a particular strain on the main pivot. T guide passing down on the insideö and r center of the rubber shoe, and as the ru ber makes this hole airtight at both and bottom, it is simply filled with graphite, and in this way the entire we ing parts of the shoes are lubricated at times.



Lea's Heavy Traction Wheel.

e rubber blocks should become thin-course of time, the play can be taken tightening up the nuts on the pins ; through the shoes. If it should be-ıecessary in slippery weather to put ıgh' shoes, this can be readily done, is not expected that it will be neces-The hubs of the wheel are made of ɔle iron and are designed to allow ng either roller or plain bearings. given load, the wheel is said to have the same width of tread as the solid tire. It is claimed to be light in and inexpensive to manufacture.

n Pressed Steel Frame Running Gear.

accompanying cut shows one of sev-:yles of pressed steel frame running manufactured for the trade by H. F. in & Co., 2108-2110 N. 9th St., St. Mo. The frame of this gear is hung ally low, as the firm for whom it was intended to construct a racing ma-with same. The front steering axle " square with taper roller bearings. heels are of the artillery pattern with ıubs, brass caps, hickory spokes and s, also steel rims shrunk and bolted e wheels ready to take 32" x 4" er tires. The rear wheels have :ets and brake bands properly fast-in place for side chain drive. The is 56 inches and the wheel base 100 . The steering device is of the worm ear sector type, positive and without lash.

A New Automobile Shirt.

: National India Rubber Company, of ıl, R. I., have just put a new automo-ıirt on the market which is claimed to ·ge, yet light and compact, so that it once comfortable to wear and readily l away in a small space when not The shirt is said to be a thorough :tion against a storm. The front is ıed with a double row of ball and t buttons. The collar laps over in and ties with a draw string, making possible for water to get down the and the sleeves have elastic bands at rists, making it equally impossible for to enter there.

'erm "Horse Power" Taking Root in French Auto Circles.

French automobile circles, the same as some foreign expressions are gradu-oming into general use, among others nglish term "horse power." A corre-ent in one of our Parisian contem-ies, referring to this matter, works lf up to a high pitch and states that ill not accept any bill rendered him ining the abbreviation H. P., but will it back and have it "corrected."

COMMUNICATIONS

Treating Cuts in Tires.

Editor HORSELESS AGE:

Perhaps my experience with automobile tires may give your correspondent the information which he requires. The tires on my 1,800 pound car are of a well-known and popular make. The outer shoe seems to have been cured in such a way as to make them particularly susceptible to cuts by sharp stones. I was considerably worried after five or six hundred miles of use to find that my tires were covered with cuts of varying sizes, though few of them were of such extent as to make it worth while to have them re-vulcanized at $3.50 per job. However, I realized that if some of the deeper ones were not closed, sand-boils would be formed, to the ultimate destruction of the tire. I tried various methods of cementing the cuts together, but found that nothing would hold even temporarily. I happened to find, in the advertising columns of the HORSELESS AGE, the ad. of the vulcanizer made in Topeka. I sent for one, rather doubting the wisdom of investing in it, but "snatching at straws" in the vain hope that I would be able to preserve my tires, at least during the summer. By following the directions accompanying this device, I succeeded in making a first-class repair with a first trial.

I find that even in an injury to the extent the size of a silver dollar, where the surface rubber must be removed, and also cuts which penetrate to the last layer of fabric, if the surfaces are carefully cleaned and prepared with the cement supplied with the vulcanizer, and the cut is filled with crude rubber and heated to the proper temperature, the result is astonishing, as it will bear comparison with the work of any of the professional tire-makers.

Recently, on a trip to Atlantic City, I discovered a cut evidently made by a broken horseshoe, as it was triangular and had penetrated to the fabric. As the road from Philadelphia to Atlantic City is principally fine gravel, I was afraid that the tire might be permanently injured. As I did not care to stop and vulcanize at this place, I cleaned the cut as carefully as possible of all foreign material, washing it with gasoline and then coating it inside with the cement. When this had dried to the proper extent, I filled the cut with the crude rubber and then proceeded on my way. I found that the rubber was still in place when we reached Atlantic City, forty miles beyond, and, in fact, it is still there, as I have not had an opportunity to properly vulcanize it permanently.

This is the only method I know of by which a temporary repair can be made on the road, and it is of extreme importance, not usually appreciated by the automobilist, that cuts in the outer tire should be repaired at the earliest opportunity. Sand and water work in between the rubber and the fabric, causing the rubber to be stretched out of position and the fabric to rot away. When an undue strain comes, the fabric will give way and a bad "blow out" will occur. In making the repairs, either of a temporary or permanent character, it is of the greatest importance that the cut or injury should be carefully prepared, it being much better to spend fifteen minutes cleaning and washing the place than to be obliged to do the work over, from the fact that the new rubber has not adhered. I make it a point to be absolutely certain that the cut has been cleaned of all grit, scraping the edges with a knife and then coating them with three or four coats of cement, allowing each one to dry before the raw rubber is inserted. I have now, on my tires, the marks of four or five patches, which have been in use for nearly a thousand miles and there is no sign of them giving away, and, in fact, as far as they are concerned, the tires are as good as new.

In the matter of inner tubes, I have long since abandoned the use of cemented patches for a permanent repair, as I find that by vulcanizing, a neat and permanent patch can be made and one is relieved of the trouble of having patches melt off in hot weather. I still use the cemented patch for temporary repairs on the road, but replace them upon returning home by vulcanizing.

Personally, I believe that the average automobilist can re-vulcanize small cuts on both his outer tires and inner tubes with the device which I mention, and thereby save himself a great deal of time and no small amount of money.

J. M. BULLOCK.

Parts Men Object to Manufacturers Furnishing Complete Equipment.

Editor HORSELESS AGE:

It has come to us from different sources, as well as from the editorial in your current issue, that automobile manufacturers are considering to furnish a very complete equipment with their cars to their customers. The decision would be far-reaching and of great importance to all firms engaged in the parts business. The writer's firm, for instance, is making important and expensive improvements for 1905, jobbers and dealers are waiting for illustrations of our new goods, but in view of these rumors we are naturally hesitating.

If the market for parts is limited to the makers, the writer can imagine all of them making their year's contracts within a period of three weeks, and the orders will largely go to the firms producing the cheapest goods. In substantiation of this assertion, I would mention that one of the leading automobile manufacturers now includes a cheap lifting-jack in his outfit, and when asked why he selected such a poor make, replied, "Well, it's an outfit."

If the manufacturers want to give more for the money, let them reduce prices, but restrict the equipment to the simplest devices and such as must be especially adapted to their cars. The writer has had a large experience with the wholesale carriage manufacturing trade, and knows the effect of such a move on trade in general. A thing that costs nothing is not worth a trading stamp as a seller.

PARTS MANUFACTURER.

Treatment of Tire Cuts.

Editor HORSELESS AGE:

In reply to inquiry of Mr. Cline in the HORSELESS AGE of September 14 regarding cuts in tires, would say that I had a 1½-inch cut across the tire, through to the fabric, which I treated as follows: I cleaned the edges and surface around same as for patching, then filled the cut with tire cement and let it thoroughly harden. After it had hardened I put on a generous patch cut from a bicycle inner tube. That patch is still sound after running 1,500 miles, and will take only a few moments to renew when worn, and the tire seems no worse for the cut.

FRED LOCKWOOD.

Delivery Wagon Minus Motor Wanted.

Editor HORSELESS AGE:

We have an inquiry from one of our customers for a heavy delivery wagon to be operated by gasoline engine. Can you give us the name of any party who would make the wagon complete for us, so that we would only require to supply the engine and accessories?

H. M. W.

[We shall be glad to forward replies from readers.—ED.]

Ignition Query.

Editor HORSELESS AGE:

Will you kindly explain in your columns the difference in effect of wiring batteries zincs to carbons or zincs to zincs? I don't at the moment recall the technical terms for the different methods. E. H. B.

When the zinc of one cell is connected to the carbon of the next, the battery is said to be connected in series. The terminal voltage will then be equal to the voltage of a single cell multiplied by the number of cells so connected, but the full current passes through each of the cells. On the other hand, when zincs are connected to zincs and carbons to carbons, the battery is said to be connected in parallel; the voltage available is then only that of a single cell, while the current in the circuit is contributed to equally by the separate cells, each furnishing only a fraction of the total. In other words, the effect of series connection is to increase particularly the voltage or pressure in the circuit, while the effect of parallel connection is to increase particularly the current. The article under "Maintenance and Repairs" this week refers also to this matter.—ED.

Pull of Horse and Automobile.

Editor HORSELESS AGE:

Can you tell me how many pounds a 1,200-lb. horse can pull on a level road (actual pounds pull on scale, not the load on wheels)? Also, how many pounds an 8 h. p. auto, weighing 1,000 lbs. with a 200-lb. man on it, can pull on a level by scale pounds? Do you know of an auto made to haul a trailer and do light farm work?

S. I. FRIES.

[We do not know the pulling power of horses, but possibly some reader can enlighten us on this subject. An 8 h. p. automobile weighing 1,000 lbs. should exert a maximum pulling force on the low gear of 180 to 200 lbs. Almost any car with a sufficiently strong motor will serve to draw a trailer if the roads are not too hilly.—ED.]

Spells of Weakness in Engine.

Editor HORSELESS AGE:

In reference to the trouble described by "W. E." in your issue of September 21, I would suggest that the symptoms are such as would be manifested by the occasional failure of the exhaust valve to close properly because of a weak spring, fouled stem or some other cause. It seems improbable that this should cause the trouble in a four-cylinder engine, still a careful examination of the exhaust mechanism may reveal the cause. It is hoped that when "W. E." finds the source of the trouble he will give the fraternity the benefit of it.

F. N. B.

Straw Roads.

Editor HORSELESS AGE:

As there appeared in your last issue to hand a good deal on the dust problem, as it concerns automobilists and residents along much frequented roads, I thought it might be interesting to some of your readers to learn of a "slick" way of fixing sandy country roads so that they are not only dust proof, but allow an automobile to glide over them with great ease, even though the sand is very deep. In this part of the country (Oklahoma Territory) much wheat is raised, and we have therefore plenty of straw for making straw roads. It is found that two men can make half a mile of straw road per day, even if the road is of the worst sand, and as much as four miles per day if the road is already in fair condition. The work includes hauling the straw and spreading it evenly over the road. All the road superintendents in this territory employ this method of improving the roads, and it has changed a sand bed into what may be described as a fine auto speedway. Mown grass, weeds, etc., are just about as effective as straw. I have had no experience with mud roads, so am not prepared to say how the method would work on such roads.

G. F. G.

BEGINNER'S PAGE

The Causes of Vibration in Gasoline Engines.

Vibration in gasoline engines is due to two distinct causes, viz., non-uniformity in the process of power generation (the explosive or intermittent nature of same) and lack of balance in the moving parts. In order to more clearly understand the first of these, it will be well here to state that theorem of theoretical mechanics known as the parallelogram of forces, which serves to graphically determine the resultant of two forces acting simultaneously on a point. The theorem is to the effect that if the two forces are represented in magnitude and direction by straight lines drawn through the point of application, and parallels are drawn to these lines through their outer ends, to form a parallelogram, the diagonal of this parallelogram from the point of application of the force represents the resultant, both as regards magnitude and direction.

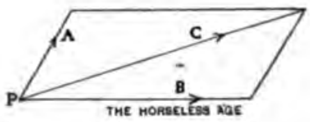


FIG. 1.

For example, in Fig. 1, P is a point upon which two forces are acting simultaneously, in the directions indicated and with intensities proportional to the length of the lines A and B. The diagonal C, therefore, represents both the direction and the intensity of the resultant force, and the effect upon P will be the same as if but one force were acting upon it with a direction and intensity corresponding to C. From this same diagram it can be seen that a force of given direction and intensity can be resolved into two or more components which, if acting at the same point at the same time, would produce the same effect as does the force itself.

The application of the parallelogram of forces in studying the vibration in a gasoline engine is seen in Fig. 2. Here we have shown an engine crank, connecting rod, piston and cylinder (in dotted lines). Consider that the piston is moving outward on the power stroke and that it has reached about the middle of this stroke. In this position the angles are large, and the diagram is therefore particularly clear. The point P is the center of the wrist pin and corresponds to P in Fig. 1.

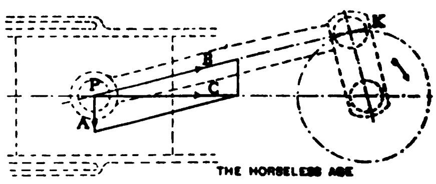


FIG. 2.

pressure exerted on the piston by the g gases is in the direction of the er center line, and as it is evenly dis- d over the surface of the piston, may nsidered localized at the center of This pressure is resolved into two nents, one acting in the direction of nter line of the conecting rod, and the perpendicular against the cylinder below the piston. The intensities of two components are proportional to

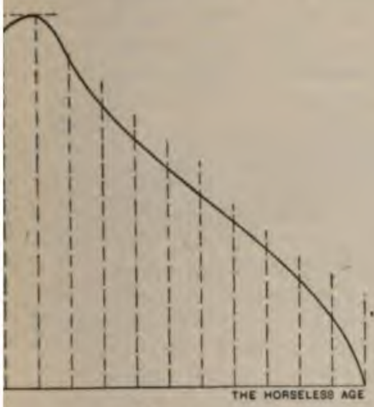


FIG. 3.

ngth of the lines A and B in Fig 2, ng the sides of a parallelogram the di- l C of which is proportional to the re exerted by the burning gases on ston. It will be noticed that the press- force in the direction of the connect- d is greater than the pressure on the , which may not seem reasonable at but is, nevertheless, quite correct, as ston and conecting rod together form of toggle arrangement by which a may be multiplied as by a lever. are here particularly concerned with mponent A, as it is the one that causes bration. This downward pressure on wer side of the cylinder wall varies uously during the power stroke, in- ng very rapidly during the first part of roke and then decreasing more slowly o, which is reached at the end of the The diagram Fig. 3 shows how this re varies from the beginning to the f the power stroke. We here neglect eight of the piston, which, of course, roduces a downward presure on the er wall, but since it is constant it can- oduce any vibration. downward pressure on the cylinder ends to turn the cylinder about the rd support of the engine, and if the shaft was fixed and the cylinder ar- l so that it could rotate, the cylinder engine would revolve instead of the shaft, the rotary effect or torque being me in the two cases. The vibratory of this pressure on the cylinder wall is y most noticeable when the engine is g at slow speed, and is very apparent t single runabouts. Suppose the en- be arranged with its cylinder to the f the car, and so that the power stroke occurs during the upper half of a revolution of the crank shaft. The frame and body of the car will then be subjected to a rocking motion in the opposite direction to the motion of the crank shaft, during each explosion stroke, the rear springs compressing and the front springs extending slightly.

It will be seen that when the center of the cylinder and the center of the crank shaft are in line, the greater the length of the connecting rod for a given stroke the

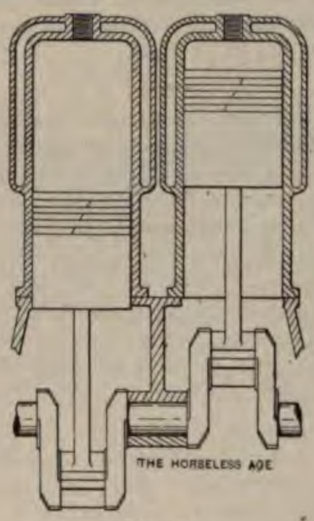


FIG. 4.

smaller will be the angle between B and C in Fig. 2, and also the intensity of the component A. In practice, however, the length of the connecting rod is limited.

As has been said, the second cause of vibration in a gasoline engine is lack of balance in the moving parts. If vibration from this cause is to be avoided, all the rotating parts must be distributed around the center line of rotation so as to exactly balance each other around this line. The rotating parts must also be equally distributed on both sides of a central plane of rotation. The vibration due to want of balance of moving parts increases with the speed of rotation. An ordinary single throw crank is entirely unbalanced, and to reduce the vibration in single-cylinder engines, counter-weights or balance-weights are secured to the crank shaft extending from it radially in a direction opposite to that of the crank arms, and these weights are made of such size as to balance not only the crank arms and crank pin, but also part of the connecting rod, as the crank end of the connecting rod also revolves with the crank pin and produces vibration unless balanced in some manner.

The rotating parts can thus be perfectly balanced, even in a single-cylinder motor, but unfortunately this is not the case with the reciprocating parts. During the first part of each stroke a rapid motion must be imparted to the piston and rear part of the connecting rod, which, owing to the inertia of these parts, requires a considerable effort. The reaction of this effort comes on the engine frame and tends to move it in a direction opposite to that in which the piston is moving. The effect is the same if a man standing on the ground suddenly pushed against the engine frame. During the latter half of each stroke the effect is reversed, as the piston is quickly brought to a stop, and the energy of motion stored up in it is expended on the frame, tending to cause the frame to move in the same direction as the piston.

This effect is partly obviated in a two-cylinder engine (Fig. 4) in which the two pistons move always in opposite directions. It would be entirely obviated if the two pistons were in line with each other, but as they are not, there is a slight rocking effect in the plane through the center lines of the two pistons. Only in a four-cylinder engine can all the moving parts, both rotating and reciprocating, be perfectly balanced.

Duryea Aeronautic Motor.

The accompanying photo shows a two cylinder gasoline motor recently built by the Duryea Power Co., of Reading, Pa. The motor is shown stripped of water and fuel tanks, carburetor and ignition apparatus, and weighs in this condition 90 lbs. Completely equipped, ready to run, without batteries, it weighs just under 100 lbs., and develops on a brake test a maximum of 16 H. P. It is shown without flywheel, because the propeller to which it is attached serves this purpose. The cylinders are opposed. They are of 4⅝ inches bore x 5½ inches stroke, and jacketed with cylindrical copper jackets. The inlet and exhaust valves are placed in the head and clamped in position by a single nut, which makes them readily removable. Bearings, crank shaft and wearing parts are quite large, so that the motor, although very light, ought to give reliable service. This motor is one of three of this same kind that have been built for aeronautic work.

DURYEA AERONAUTIC MOTOR.

OUR FOREIGN EXCHANGES

The Coming Paris Exhibition.

The Paris Automobile "Salon," under the auspices of the Automobile Club of France and the French Automobile Manufacturers' Association, will this year be held December 9 to 25 in the Grand Palais in the Champs Elysées. An annex will be installed in a nearby municipal building, where motors can be shown in operation. The annex will also comprise the sections of heavy commercial vehicles, machine tools for automobile construction, motor boats, air ships and industrial applications of denaturated alcohol.

The main hall in the Grand Palais has a main aisle running through it between the main entrances on opposite sides, and the stands on both sides are very much in demand, although the space rent is just double what it is in other parts of the hall. The show management desired to let these spaces to the oldest and most capable firms of the industry, and that it might do so without causing friction, instituted a competition for points to decide the eligible applicants for these spaces. Points are allowed as follows: Period of establishment of firm, five points for each year; participation in competitions organized by the Automobile Club of France and the French Government—three points for each first award, two points for each second award, and one point for each other award or simple participation; participation in races—three points for first, two points for second, and one point for other awards or participation in the annual exhibitions of the French Automobile Club, five points for each year; participation in the French World's Fairs, five points for each year; participation in foreign exhibitions at which the French Government was officially represented, three points for each year; awards received at all these exhibitions, five points for first awards, four points for second, three points for third, two points for fourth, and one point for fifth awards. All these points will be added together and the manufacturers standing at the head of the list, based on number of points, will participate in an assignment of spaces by lot.

One of the features of the show will be model room for provincial hotels as the automobilists would like to find it everywhere when on their tours. It is exhibited by the Automobile Club and is intended to teach a lesson to provincial hotel men.

Belgian Imports and Exports.

During the first six months of the current year Belgium imported 79 complete automobiles valued at $74,580, compared *with 67 cars valued at $52,500 during the* same period last year. During the month of June alone 19 cars were imported valued at $13,715. While the imports thus showed an increase the exports decreased considerably. A total of 87 cars valued at $137,914 were exported from January to June, 1904, while last year during the same period 105 cars were exported, valued at $142,661.

Leagues of pedestrians, whose efforts will be specially directed against automobile speeding, have recently been formed in London and in Brussels.

E. Tronchet and Henri Chretien, two French astronomers, used an automobile as a traveling observatory in a study of the Leonides during 1903, a report on which has just been read before the Academy of Sciences.

A franchise for an automobile line between Locarno and the Italian frontier has been granted to Borella, Luigi & Co., Intra, Canton of Tessin.

The Automobile Club of Seine et Oise, France, which some time ago conducted some very successful trials of anti-skidding devices, has decided to organize a reliability contest similar to the recent British small car trials, with Versailles as starting point.

The German Automobile Club is organizing an automobile show, to be held at Berlin from February 4 to February 19 next. We notice that one of the regulations is to the effect that any exhibitor who has not completed his exhibit in a satisfactory manner at the time of opening, loses all rights to his space.

According to *Indian Engineering*, the Ceylon Government is seriously considering the proposition of substituting on all fit roads light automobiles for the old stage-coaches which still exist on important routes for mail and passenger traffic. The required speed is thirty miles an hour, and each vehicle must carry 6 passengers, 300 pounds of letters, and 26 pounds of baggage.

The master patents on clincher tires in England are about to expire, and a considerable reduction in price is expected to be the immediate result. It is said that at present French tires cost 50 per cent more in England than in France, but after the expiration of the patents owned by the Dunlop Co., and the consequent cessation of royalties, tires will sell at the same price at both sides of the channel.

An automobile race meet was held on Tuesday and Wednesday, September 7 and 8, on the Velvet Strand at Portmarnock, near Dublin. The course did not prove so fast as had been hoped, owing to unfavorable winds blowing loose sand on it. The best time of the meeting was accomplished by the six-cylinder 90-h. p. Napier, which covered the standing-start mile in 57 2/5 sec., about sixty-three miles an hour.

The British Society of Motor Manufacturers and Traders has elected new officers as follows: President, Mr. Sidney Straker; vice-presidents, Messrs. H. Austin and J. E. Thornycroft; treasurer, Capt. Deasy. The four gentlemen above named and the following constitute the Committee of Management: Messrs. H. G. Burford, T. Clarkson, F. W. Coleman, Geo. DuCros, E. M. C. Instone and H. Sturmey.

According to official statistics published by the French Minister of Finance, the assessment lists for all France in 1903 showed 7,228 automobiles with seating capacity for more than two persons and 2,694 with seats for one or two. The number of automobiles entitled to half rates was 1,907 in the class with seats for more than four and 1,155 in the class with seats for one or two. This makes a total of only 12,984. Evidently French automobilists are pretty good tax dodgers.

According to the *South African Trade Journal*, an extensive field offers itself in South Africa for the sale of motor wagons by a firm with sufficient enterprise to send out representatives to the spot to examine the local conditions, and thereupon undertake a series of lectures and practical demonstrations for the benefit of farmers on a large scale. The same remarks, adds the *Journal*, also apply to ploughing by steam or motor traction.

During the maneuvers at present being held in the east and northwest of France, a number of automobilists among the reserves use their cars for rapidly carrying staff officers from place to place. Two highspeed cars and two light cars are assigned to each general's headquarters, and each army corps has further a fast and small vehicle. The "chauffeur-reserves" are allowed compensation at the rate of about one cent per horse power per mile, twenty-eight cents per horse power per day, as well as a fixed rate of fifty to sixty cents per day.

Calendar of Automobile Dates and Events.

Sept. 30-Oct. 1—Races at Harlem track, Chicago.

Oct. 14-22.—Leipzig Automobile Show.

Nov. 24.—Eagle Rock (N. J.) Hill Climbing Contest.

Dec. 9-25.—Paris Show.

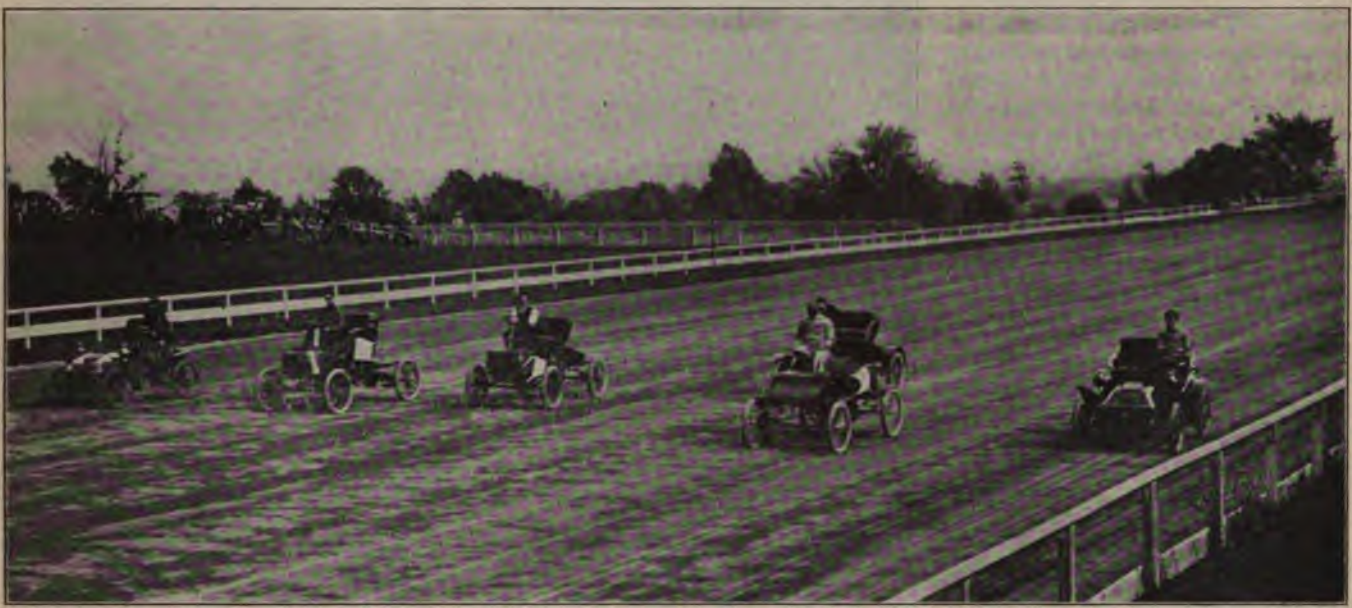
Jan. 11-24—Importers' Automobile Salon, New York.

Jan. 14-21—New York Automobile Show.

Empire City Track Race.

There was a large attendance at the fall automobile race meet at the Empire City trotting track, Yonkers, N. Y., last Saturday, but the event fell rather flat, owing to the inability of the star racers advertised to appear in some of the events to keep their engagements. Carl Fisher, of Indianapolis, who was to drive the eight-cylinder Premier Comet in a match with H. L. Bowden's 100-h. p. Mercedes "Flying Dutchman," had the misfortune of breaking a crank shaft while practicing on the track the day before the race, and was unable to get a new shaft in time, and the "Flying Dutchman" cracked its two front cylinders after having completed a mile in 54 seconds just before the start of the programme, and had to be towed off the track. Besides these two, another of the drivers entered whose name is well known to the public, the jockey Tod Sloan, was unable to appear, being detained by the police in New York for speeding. The result was that not a single fast machine in the heavy class appeared on the track during the afternoon, while, on the other hand, the records were lowered for the middleweight class for from 2 to 10 miles inclusive, and the present holder of all records for the lightweight class (the Ford racer) ran in a number of events, but did not establish any new figures.

Any one who attended both the meet of last Saturday and the corresponding meet of last fall could not help but be struck by the rapid changes in the "track racing game." There were no "Bullets" and no "Wolves" this year, nor any of the old-time favorite drivers. The only American manufacturer who was represented by a specially built racer was the Ford Motor Co., and its machine is of the very lightest type, and consists simply of a running gear upon which are mounted two Ford runabout engines, coupled together and chain geared directly to the rear axle, without change speed gear. This is also the only American machine which is making the entire racing circuit the present fall. The two importers who last year employed French crack drivers and sent them the entire round of the circuit are this year also "laying low." The only conclusion which can be drawn from this wholesale desertion in the ranks of firms who participate systematically in track races is that track rac-



Start of First Event.

Event No. 3, Old Glory Cup, Five Miles.

ing does not pay as an advertising venture. There is as yet no perceptible falling off in the attendance at races, but those who go there seldom do so to get pointers on machines they may wish to purchase; they go out of curiosity or because they have nothing else to do—not to learn. A number of the cars which ran in the events on Saturday last were owned by wealthy private automobilists—a feature which will probably become more prominent in connection with races in the future.

The races began promptly at 2 o'clock and finished comparatively early—about five o'clock—owing to the several walk overs and cancellations of events. The weather was fine all the afternoon. The first event was five miles for the Yonkers cup, open to cars of any motive power retailing at $1,000 or less. There were six entries and all started. A 10-h. p. autocar entered by A. G. Spalding & Bro. and driven by Rodney Peeler drew ahead of the bunch from the start and won with a handsome margin in 8:15 3-5. A Pope-Hartford was second and a Buckmobile third. In this race cars were required to carry the regular equipment, except that the tonneau could be removed and manufacturers entering cars were held to accept offers of purchase of the cars at catalogue price after the race.

The second event on the programme, a five-mile exhibition by the Premier Comet, was not run. The third event was five miles for the Old Glory cup, open for American touring cars of any motive power. Cars were required to be run with regular equipment, including tonneau, and each car had to carry three passengers in addition to the operator. The operator first had to start the motor by cranking, then jump in and drive the entire distance. Two Pope-Toledos, a Peerless and a Walter started in this race. The Pope-Toledo, driven, by A. S. Lee, got away quickest, but was soon overtaken by the other car of the same make and by the Peerless, which latter was driven by A. E. Morrison. The latter two cars kept close together througout the race, the Pope-Toledo slightly in the lead. This car won the race by a margin of one second, its time for the five miles being 7:12 3-5.

The next event was ten miles for the Knickerbocker cup, open to all cars weighing from 881 to 1,432 pounds. Of the seven entries three started, viz., the Ford racer, driver by Frank Kulick; a Meteor stripped touring car, driven by H. R. Lounsbery, and a 30 h.-p. Renault racer, driven by Joseph Tracy. The Meteor was, of course, no match for the specially built racers, and withdrew in the first mile. Kulick withdrew in the third mile, leaving only Tracy to complete the race. He completed 10 miles in 10m. 15s.

Next the first heat of the International cup race was run, bringing to the post two Italian Fiat cars of 24 h. p., driven by E. K. Wallace and Paul Sartori, respectively.

GETTING READY FOR THE HANDICAP RACE.

Wallace took the lead at the start, but was overtaken by Sartori in the first mile, and the latter won by about one-eighth of a mile in 6m. 20s. Owing to the accident to Bowden's Mercedes car the second heat, for German cars, was not run, it being a walk-over for E. R. Thomas' 60-h. p. Mercedes, driven by Edward Hawley. For the same reason the third heat, for American cars, was not run, there being only two entries, and one of these, the Premier Comet, being incapacitated. The heat was therefore a walk-over for Frank Kulick (Ford). In the fourth heat, for French cars, there were four entries, but only two came to the post, a 70-h. p. Panhard, entered by M. C. Herrmann and driven by Felix Froger, and the 30-h. p. Renault of W. G. Brockaw, driven by Joseph Tracy. Something seemed to be the matter with the Panhard and it withdrew in the first mile. Tracy completed the five miles in 5m. 8 3-5s., establishing a new world's record for middleweight cars for two miles.

The next event was the first heat of the Empire handicap. The entries in this handicap race with their handicaps were as follows: 24-h. p. Peerless, 1m. 15s.; 20-h. p. Ford, 10s.; 10-h. p. Autocar, 3m. 15s.; 60-h. p. Mercedes, scratch; 24-h. p. Pope-Toledo, 1m. 15s.; 10-h. p. Pope-Hartford, 3m. 34s.; 15-h. p. Buckmobile, 4m. 16s.; 24-h. p. Fiat, 1m. 22s.; 24-h. p. Fiat, 1m. 20s.; 36-h. p. Royal 25s.; 24-h. p. Pope-Toledo, 1m.

START OF A HEAT IN THE HANDICAP RACE. GRAND STAND ALREADY PARTIALLY VACATED.

15s.; 30-h. p. Renault, 8s. The first heat was won by No. 17 24-h. p. Fiat, with a handicap of 1m. 20s. Its actual time was 6m. 10 1-5s. The second heat was won by the 15-h. p. Buckmobile. Time, 8:22 3-5. The final heat was won by Paul Sartori (Fiat). Time, 8m. 2 1-5s.

Vanderbilt Cup Race Preparations.

According to a statement of the committee in charge of the Vanderbilt Cup race, about 90,000 gallons of oil will be required to twice sprinkle the twenty-eight miles of the course. The proceeds from the sale of boxes and seats is to be expended for the purpose, and to provide a contingent fund to meet any possible deficiences, a subscription list has been started, which at the time of writing amounts to about $500.

Sixty-five of the eighty boxes in the grand stand at Westbury and nearly two-thirds of the seats have been sold. To avoid speculation in seats and boxes, not more than two seats, nor more than one box will be sold to any individual, except members of clubs in the A. A. A. affiliation.

The arrangements for telephonic communication along the course have been placed in the hands of the New York and New Jersey Telephone Co., who have assigned an engineer to work out the details. Two systems will be installed, one for the judges and checkers and another for the timers.

As the cars are started, no one except the starter and two technical advisors will be allowed to approach them and but one car will be brought to the tape at a time. Upon the departure of the last car, the space in front of the grand stand will be kept free of pedestrians. These precautions are taken to prevent accidents.

Bulletins have been posted in the towns through which the route passes calling attention to the fact that the cup course will be cut off to all vehicles on the day of the race from five o'clock in the morning until three o'clock in the afternoon, and asking the natives to co-operate with the association in their efforts to avoid accidents, by keeping off the road themselves and confining their live stock during the race.

Racing Notes.

An automobile race meet will be held at the Danbury (Conn.) Fair on October 4th.

The date for the record trials at Ormond-Daytona, Fla., has been set conditionally as November 7th.

The plans for an automobile tournament to be held in Havana at some not distant date include a 300-mile road race over the 60-mile stretch between Havana and San Cristobal.

The Rhode Island A. C. has filed a protest with the racing board of the A. A. A. against the non-appearance of several formally-entered drivers at the recent Providence meet.

L. P. Doerhoefer, while attempting to establish a new 24-hour record on the Douglas Park track in Louisville recently, ran off the track and smashed his car, severely injuring his assistant.

The program for the race meet at Point Breeze track, Philadelphia, October 1, contains five events, as follows: Fifteen miles for cars weighing 1,432 to 2,204 pounds; ten miles for cars weighing 881 to 1,432 pounds; five miles for cars weighing 551 to 881 pounds; Point Breeze Handicap at five miles; fifteen miles for 24-h. p. touring cars to carry four passengers. Entries are received by H. D. LeCato, 712 Girard Trust building, Philadelphia.

Commercial Vehicle Notes.

Myers & Son, livery men of Redfield, S. D., have recently added a second automobile to their equipment.

The Pillsbury-Washburn Co., of Minneapolis, have purchased a five-ton electric truck for use in delivering flour in Minneapolis.

The advisability of purchasing an automobile for the water works department is being discussed by the Board of Public Service of Dayton, Ohio.

Police Commissioner McAdoo, of New York, will ask the Board of Aldermen to limit the size of the "Sight Seeing" automobiles, as he believes that those in use now are so large as to impede traffic.

The Civic Works Committee, of Toronto, recommends that the city appropriate $2,500 for the purchase of an automobile for Assistant City Engineer Fellows, in charge of the water works, for use in making his inspection rounds.

The mayor and board of public safety of Cincinnati are considering the advisability of purchasing motor propelled fire engines for the city's fire department. A member of the board estimates that the cost of feeding the horses now used in that department is about $14,000 a year.

Trade Literature Received.

Empire Rubber Mfg. Co., Trenton, N. J.—Circular of rubber tire shoes or sleeves.

H. D. Weed, Canastota, N. Y.—Catalogue of Weed's chain tire grip (to prevent slipping of automobile or motor cycle tires in mud snow or on ice).

H. W. Johns-Manville Co. 100 William street, New York.—Circular on the company's fuse exhibit at the St. Louis Exposition.

The Post & Lester Co., Hartford, Conn.—Folder of the new Never-Skip spark plug.

Palmer & Christie, 239 West Fiftieth Street, New York City—Catalogue of Martini cars.

William Roche, 52 Park Place, N. Y. City.—Catalogue of dry batteries, coils, and electrical automobile supplies.

Club Notes

BUFFALO A. C.

Fred J. Wagner has resigned as secretary. His successor will be elected at a meeting to be held this week.

GRAND RAPIDS A. C.

A club run was held on September 22, fifteen cars participating. The destination was the fair grounds, where an exhibition and races were held.

N. J. A. AND M. C.

Plans are being formulated for a club run of about 100 miles, to be held next month. The route selected will probably be confined to the limits of the State.

BERKSHIRE A. C., PITTSFIELD, MASS.

The second annual field day was held on September 19. The programme included a club run to Pleasure Park and a clam bake and race meet at that place. The winners of the various events were Franklin Weston and Floyd Knight.

A. C. OF NEW JERSEY.

At a meeting on September 22 it was decided to establish club rooms in a building at the corner of Harrison and Railroad streets, Brick Church. The building provides garage facilities, the use of which is extended to members and visiting automobilists.

DELAWARE A. A.

The first officers of the association (located at Wilmington, Del.) are: Pierre S. DuPont, president; William G. Mendenhall, vice-president; and Wilbard C. Jackson, secretary and treasurer. A committee has been appointed to consult with members of the City Council in regard to the proposed automobile ordinance.

HOUSTON (TEX.) A. C.

Organization was completed at meeting on September 15th, and officers were elected as follows: President, G. J. Palmer; vice-president, Spencer Hutchins; secretary, Miss Bering; treasurer, Dr. M. J. Lossing. Directors—Theodore Bering, W. A. Burkett, Harry Dooley, Dr. W. R. Eckhardt, Charles A. Meyers, D. Peacock and Dr. W. M. Brumby. Headquarters were established in the building of the Hawkins Automobile and Gas Engine Co. It is proposed that the club take part in the coming carnival.

CHICAGO A. C.

At a meeting of the directors on September 20, twenty-five new members were elected, bringing the total membership to 475. The racing committee has been increased to six members and John E. Fry succeeding F. C. Donald as chairman, resigned. The other members of the committee are Jerome A. Ellis, Dr. F. C. Greene, W. G. Lloyd, Frank X. Mudd and

Dr. J. B. Weintraub. An additional $1,000 was voted to the racing fund. Arrangements were made to entertain the wives of the members of a delegation from the British Society of Civil and Mechanical Engineers, who will visit the city on September 28. The programme includes a ride through the city and a dinner at the Saddle and Cycle Club.

New Incorporations.

Mason-Harvey Co., Chicago, Ill. Capital $2,500. Incorporators, W. W. Harvey, W. R. Mason and Abner A. Hodges.

Auto Repair Co., Ltd., Pittsburg. Capital $5,000. Incorporators: Rex Remertson, J. D. Thompson and Truman W. Campbell.

Milwaukee Motor Company, Milwaukee, Wis. Capital $25,000. Incorporators, F. L. Ford, Edgar E. Warner and A. W. Warner.

Stanley Motor Carriage Co., Watertown, Mass. Capital $95,000. Incorporators: F. O. Stanley, F. E. Stanley and R. P. Elliot.

The Amos-Pierce Automobile Co., Syracuse, N. Y. Capital $1,000. Incorporators: C. L. Amos, H. C. Pierce, G. H. Dennison.

Maryland Automobile Co., Baltimore, Md. Capital $10,000. Incorporators: J. Henry Miller, Dr. Ira L. Fetterhoff, Henry R. Borman, Myron W. Higgins and John J. Mason.

The Albany Club, Albany, N. Y. Capital $5,000. Incorporators: William Milbank, Oliver A. Quayle, Charles N. Page, John Newell, Joseph B. Taylor.

Kelly-Bridgett Company, Danville, Ill. To manufacture automobiles. Capital $50,000. Incorporators: Edward J. Kelly, William M. Bridgett and George Buckingham.

Indiana Scale Truck Co., Toledo, O. To manufacture automobiles, bicycles, scales and trucks. Capital $100,000. Incorporators: Samuel Snell, R. S. Dakin, G. F. Miller, Sr., John Renner and R. Fuller.

Commercial Vehicle Work in England.

E. Shrapnell Smith, who has been prominently connected with the heavy motor traffic movement since it has existed, recently compiled a table of statistics in regard to the number and distribution of motor vehicles of all kinds in the United Kingdom. From this it appears that there are at present engaged in heavy goods haulage 950 motor vehicles; in the public passenger service, 470; and for business purposes, 2,380 cars. There are no previous figures with which to compare these returns, but it is probable that they represent an increase of at least 25 per cent. in the last twelve months.

In proportion to the possible development of the use of automobiles for heavy traffic, the returns are not large, but it must be borne in mind that the legislation on the subject of heavy motors has been quite impracticable, and has delayed for years the evolution of the motor wagon. With the three-ton tare limit, as laid down in 1896, it was impossible to construct a wagon which should be strong enough for the work and carry a profitable load. Makers who tried to produce such a vehicle had so to cut down the weight and strength of their wagons that they were always in trouble. As a matter of fact, most of the wagons built since 1900 have been illegal in weight, but they have been tolerated on the streets because the authorities recognized that the law on the subject was unsatisfactory. New regulations have been drafted by the Local Government Board, which will put matters on a much more practical footing.

For example, under the old law the maximum width over all was 6½ feet, and it was impossible to make a satisfactory omnibus with this dimension. The new limit of width will be 7½ feet. Under the former regulations, a vehicle exceeding 1½ tons was limited to eight miles an hour, and one exceeding two tons to five miles an hour. Obviously there was not much chance for an omnibus at these rates of speed, for the horse-drawn omnibuses travel up to ten and twelve miles an hour. Under the new regulations the speed of an omnibus weighing three tons, if fitted with non-metallic, resilient tires, as all passenger vehicles must be, may reach twelve miles an hour.

Apropos of tires, Mr. Shrapnell Smith expressed the view that any motor vehicle intended to travel upward of eight miles an hour must, for the sake of saving its own wear and tear, be fitted with rubber or other elastic tires. As is well known, the tire problem of heavy motor vehicles has been very difficult of solution, but there are marked signs of improvement. The Eastbourne omnibuses used to cost for tires 12 cents per car mile; they are now tired by contract by the Sirdar Rubber Company for 4 cents per car mile. The motor omnibus has been so long and so fruitlessly foretold that people have begun to disbelieve in it; but the difficulties, and they have been enormous, are being surmounted, and in the vehicles now running, or about to be put on the road, the solution will probably be found.

As regards motor vehicles for heavy goods traffic, considerable success has been attained in London, mainly because the roads are so good, and full loads can be relied upon. In the provinces the heavy roads of winter have necessitated so much running at maximum pressure that the steam trucks have proved expensive, and have only succeeded where they could get constant and full loads. Notwithstanding the high charges for labor, fuel and rent in London, it costs about 50 per cent more to run a steam truck in the provinces than in the metropolis, owing to the difference in the road surfaces encountered. It is admitted that steam trucks can only be made profitable when big loads are regularly carried. Mr. Calthrop recently stated that in his experience a motor wagon began to compete with horses when it carried six tons; it began to be profitable when it carried seven or eight tons; but it was not commercially profitable until it carried about ten tons. In the new regulations drafted by the Local Government Board, the limit of weight of the motor wagon unladen is fixed at five tons, while the load on each axle may be eight tons. It will therefore be practicable to carry a load of ten or eleven tons, if—and this is an important proviso—the total load can be distributed over both axles. That, however, is not easily accomplished, and in all probability few of the maximum loads will be carried. The Motor Van and Wagon Users' Association contends that the weight limit is unnecessary, but that there should be simply a regulation apportioning weight to the area of the tread of the wheel. As a matter of fact, there is a greater pressure on the tread of an omnibus wheel than on the wheels of a steam roller in proportion to their area. Consequently, if the wheel area is correctly proportioned to the weight carried, heavy motor wagons would improve rather than damage the roads.

Mr. Shrapnell Smith states that the average earnings of a five-ton truck in London are $85 per week, providing that it has a journey of not less than five miles, and that its load is not to be discharged at more than two points. But it is difficult to compare the cost of horse and motor haulage, since hardly any firm has kept a strictly accurate account. But the managing director of a London brewery has stated that he saves £8 per week on each of his three trucks.

Curiously enough, the light motor delivery wagon has had practically no attention given to it. Such wagons as have been made have been prohibitive in price. Gasoline wagons to carry 1½ tons have cost about $2,250; to carry two tons, about $2,500, and for the latter sum one could buy a five-ton steam truck. But prices for all motor wagons, heavy and light, are coming down, in accordance with the increased demand. The lighter classes will cost about 25 per cent less, and the heavy trucks 15 per cent less. The hardest problem to solve is the ousting of the single horse delivery wagon. When it comes to delivering light goods at many points in a small area the horse is found to be a very economical motor.

Fuller & Sullivan, Boston, Mass., are putting on the market a full line of leather clothing. Their tanning so closely resembles that produced by the famous "Swedish Process" that it is possible they have discovered that well-guarded secret.

The Burlington (Vt.) Automobile Club was organized on September 21 with a membership of twenty-five. Officers for the ensuing year were elected as follows: President, Dr. D. C. Hawley; vice-president, O. S. Presbrey; secretary, E. A. Brodie; treasurer, G. A. Churchill.

LEGISLATIVE AND LEGAL.

Automobiles on Ferries.

Secretary Metcalf of the Department of Commerce and Labor has sent a letter to the committee of the Automobile Club of America, which appeared before him recently in regard to the use of the ferries in New York City by gasoline motor cars. He says that the only remedy for the present state of affairs would be an application to Congress for legislation modifying the present statute.

Mr. Metcalf points out that the law provides that owners or agents of passenger steam vessels "should have the right to refuse to transport automobile vehicles, the tanks of which contain gasoline, naphtha or other dangerous fluids." He says that no ruling has been made by the Board of Supervising Inspectors, or any one connected with the department, but that the situation complained of is due entirely to the statute law.

The ferry companies still require that the motors of gasoline cars be stopped before the machine is placed on the boat and a number insist that the car be towed on by horses, so that there may be no delay in traffic occasioned.

Crusade Against Irresponsible Chauffeurs.

So many accidents have occurred lately in New York City owing to reckless driving of irresponsible hired chauffeurs who run their employers' cars for their own pleasure, that a decided stand has been taken against the practice by the police department and several prominent automobilists. Commissioner McAdoo has issued a warning and has followed it up with measures calculated to impress those who do not take heed. The owners of the cars have been appealed to by the president of the A. C. A. to use their influence in the matter, and the Automobile Trade Association has issued a circular to the various garage managers asking them to inaugurate some checking system which will make it impossible for a chauffeur to run a car out without the owner's knowledge and consent.

The Board of Trade of Columbus, O., has passed a resolution calling upon the City Council to pass the vehicle tax ordinance which is being held up by a Council committee.

Massachusetts Highway Commission Asked to Revoke Automobile License.

The Selectmen of Shrewsbury, Mass., petitioned the State Highway Commission to revoke the license of L. P. Sims, of Worcester, for exceeding the speed limit while passing through that town. A hearing was granted by the commission. In his own defence Mr. Sims produced an affidavit to the effect that on the day in question he was in St. Louis. He claimed further that his car was in a garage in Worcester that day, and not on the road at all. The board ruled that the owner of the car would be held responsible wherever he might be, but that the number taken by the police of Shrewsbury did not constitute an identification of the machine, and gave Mr. Sims an opportunity to produce further evidence. This was done at a hearing on September 21, when the affidavit of a Worcester garage keeper was presented stating that the car had not been on the road on August 14, the day mentioned in the complaint. More conclusive evidence was demanded by the board, and at a continued hearing on Thursday, September 29, S. K. Milligan and William F. O'Brien, who used Sim' automobile while he was away, will be called upon to testify.

Valuations of Imported Cars Raised.

The Board of United States General Appraisers, through General Appraiser Hunt, made several advances in the invoice values of imported automobiles the week before last. One was a 40-h. p. Mercedes châssis entered at 30,000 francs and advanced to 32,135 francs. It was shipped by Boin & Constantin, of Nice, France. The following advances were made on machines from the Napier Motor Company, of London: One Cape. cart hood, 15 h. p., entered at £715 and advanced to £760; one canopy cop, 15 h. p., from £750 to £785; one 24-h. p. machine, from £930 to £1,015; and one Pullman body, 24-h. p. machine, from £985 to £1,135; £30 was also added for packing charges. One second-hand 40-h. p. Napier motor carriage, shipped by S. F. Edge, of London, was advanced from £650 to £800.

John C. Caps and Louis C. Curtiss have been appointed members of the automobile operators' examining board of Kansas City.

The Automobile Club of Pittsburgh is endeavoring to have repealed the ordinance which prohibits the operation of automobiles in Riverview Park.

In the Bergen County Court, at Hackensack, N. J., on September 19, Henry Kathmeyer was given a verdict of $8,125 for injuries received by being struck by Henry Mehl's automobile.

An ordinance limiting the speed of automobiles to six miles an hour, and requiring to sound a bell or horn when within seventy-five feet of crosswalks, and to carry lights that can be seen at 400 feet, has been adopted in New Ulm, Minn.

The Minnesota State Board of Equalization has raised the assessment on automobiles in Hennepin County (Minneapolis) 33 1/3 per cent, increasing the average valuation from $479.50 to $636.96. There were 374 autos returned from the county.

The committee of Nashville (Tenn.) City Council having charge of the pending automobile ordinance granted a hearing to the automobilists on September 20. Objection was made by them to the proposed numbering of cars and, as a result, several changes will be made in the bill.

The Daimler Manufacturing Co. and C. L. Charley have brought suits against James L. Breese, Paul J. Rainey, George Baker and Mrs. Albert W. Scholle, private importers of Mercedes cars, for alleged infringement of the Selden patent under which M. Charley is a licensee.

Walter S. Boyle, Jr., of Chicago, was indicted by the Grand Jury on September 20 for driving a motor car at a speed greater than the legal limit. The indictment was found under the State law of Illinois which went into effect on July 1, 1903, and is the first true bill voted in the State for the offence.

W. J. Campbell, of Oshkosh, Wis., who is charged with having driven his car around a street corner faster than four miles an hour, has raised the question of the validity of the ordinance, claiming that it discriminates in placing a limit of speed for automobiles when driven around corners, and not for other vehicles.

Up to September 24, 500 licenses had been taken out under the new Chicago ordinance. According to a ruling of Judge Kavanagh in the case of Frederick Rawson, the members of the Chicago A. C. who were named in the petition for the injunction which is now in force, are *ipso facto* exempt from the requirements of the ordinance.

Charging fraud against Attorney A. C. Mayo, 175 Dearborn street, and Louis A. Bryan, an automobile manufacturer at 159 Canal street, Chicago, John J. Fargo, of Los Angeles, Cal., has sued for injunction in the Circuit Court to restrain the disposal of 16,680 shares in the Center-Drive Automobile Company, which, he asserts, Bryan obtained under false representations.

The City Council of Rock Island, Ill., on September 19th passed an ordinance which limits the speed of automobiles to ten miles an hour, and requires registration and numbering of cars. The penalties provided are fines ranging from $10 to 50. The automobilists of that town believe that their taking the council committee on demonstration rides resulted in a much tempered ordinance.

MINOR MENTION

The Keystone Automobile Co., of Philadelphia, will act as agents for the Autocar from October 1.

Cheney R. Prouty, of DesMoines, Ia., has taken the local agency for Marion cars, and will establish a garage and repair shop.

The Union Automobile Co., of 43 Columbus avenue, Boston, will act as agents for the Studebaker, Union, and Cameron cars during the coming season.

Henry Kathmeyer, of Hackensack, N. J., has been awarded $8,125 damages for injuries received when he was struck by a car owned by Henry Mehl.

At the annual meeting of the Electric Vehicle Co., held last week, the old officers were re-elected. It was announced that a loan of $250,000 had been paid off.

William E. Chandler, former Secretary of the Navy, was struck by the starting crank of his automobile as it "kicked back," and, as a result, his left arm was fractured.

A collision between a trolley car and an automobile in Brooklyn, N. Y., on September 20 resulted in the derailing of the car. The automobile escaped with only slight injury.

General Baldwin, U. S. A., Commander of the Department of Colorado, recommends a transcontinental run to test the practicability of motorcycles for military purposes.

The Indiana Scale and Truck Co., recently organized in Toledo, O., have purchased a plant in Bluffton, Ind., and will devote a part of their attention to the manufacture of automobiles.

Col. Pardee has sold his stock in the Packard Motor Car Co., of New York, and has retired from the management. Mr. Hurlburt, formerly with W. C. Metzger, Detroit, will succeed him.

The International Brotherhood of Teamsters of Indianapolis has decided to organize the chauffeurs, and local unions are to be established in all the principal cities, to be affiliated with the teamsters.

Creditors of the Columbus (Ohio) Motor Vehicle Co. have petitioned that the concern be declared a bankrupt, and ask that a receiver be appointed. The complainants tre the Interstate Foundry Co., the Hartford Rubber Co., and others.

The automobile school inaugurated by the Boston Y. M. C. A. last year will be continued the coming winter not only in Boston but with branches in Brockton, Hartford, Worcester and Providence. The same corps of lecturers will be heard in each city.

All of the creditors of the Crest Manufacturing Co., of Cambridge, who have of late been in financial difficulties, are said to *have been paid either in cash or notes,* and there is a possibility that the company will reorganize and resume the manufacture of automobiles.

The Rainier Co. and Quimby & Co., of Newark, N. J., have completed an electric brougham of special design for Robert Graves, of New York. The interior is lighted and heated by electricity and is equipped much after the style of a drawing-room railroad coach.

C. H. Minchin writes us that he has opened a new automobile repair and supply station in Greenwich, Conn., which is located on Greenwich avenue, about 100 feet from Boston Post Road. He is equipped to store about ten cars and to make repairs and furnish supplies to tourists.

Arrangements are being made whereby the executive committee of the National Association of Automobile Manufacturers after their meeting on October 7th, will attend the Vanderbilt Cup race in a body. Seating accommodations will be secured in the grand stand at the starting and finishing points.

The board of directors of the Cataract Machine and Automobile Company, of Niagara Falls, have elected officers as follows: President, S. P. Franchot; vice-president, Fred V. Simpson; secretary, H. W. Kellogg; treasurer, Max Amberg. The new company will begin the manufacture of automobiles and do other work in the machine line.

Hugh Gurney, Third Secretary of the British Legation, was arrested in Lenox, Mass., on September 26 for driving a motor-car faster than the legal limit. He refused to plead, claiming that under international law he was amenable only to the laws of his own country. He was fined $25 for violating the speed law and $25 for contempt of court. It is likely that the State Department will see that both fines are remitted.

The Consolidated Mfg. Co., of Toledo, held their annual meeting on September 19th. E. T. Breckenridge was elected president; Ezra E. Kirk vice-president; A. W. Coulter secretary; and J. B. R. Ranson treasurer; and these officers, with E. W. Tolerton, constitute the board of directors. It was decided to add to the present properties of the company the old plant of the Yost Mfg. Co. The company will make two models of cars during the coming season—the Yale Junior and a 24-h. p. four-cylinder touring car.

A. L. Dyke, formerly of the A. L. Dyke Auto Supply Co., writes us that he will soon move from his temporary headquarters, 311 Pine street, into a two-story building which is being erected for him on Olive street, between Taylor and Newstead, St. Louis. His new catalogue of automobile supplies is now in the hands of the printer.

The Michigan Automobile Co. inform us that they have recently established the following agencies: W. H. Whitesell & Co., 604 S. Broadway, Los Angeles, Cal., Electric Supply Co., 309 Bull street, Savannah, Ga., H. D. Clark, Jr., & Co., 217 E. Fifteenth street, Kansas City, Mo., Newark Automobile Co., corner Wright and Brunswick streets, Newark, N. J.

The A. L. A. M. to Organize a Mechanical Branch.

The superintendents and engineers connected with the various concerns which belong to the Association of Licensed Automobile Manufacturers will meet in New York City on October 7 for the purpose of organizing a mechanical branch of the association.

The representatives from the various companies will assemble at nine o'clock A. M., on the day mentioned, at the garage of the Locomobile Company, Seventy-sixth street and Broadway, and will make a run in cars supplied by members of the Association up Riverside Drive to Yonkers, Irvington and to the Ardsley Clubhouse at Ardsley-on-the-Hudson, where lunch will be served. After lunch the run will be continued through White Plains, to Travers Island on Long Island Sound, where, through the courtesy of the New York Athletic Club, they will partake of light refreshments. From this point the run will be continued to New York City. Dinner will be served at the Casino in Central Park, after which the meeting for formal organization will be held.

The objects of forming this mechanical branch are to study the tire question and to effect a standardization of parts, thereby reducing the maintenance expenses of automobile users. It is expected that some seventy-five superintendents and engineers will be present, and some twenty-five or thirty cars will take part in the run.

An Elaborate Private Garage.

A very elaborate and somewhat oddly designed garage is now nearing completion at Groveland and Hennepin avenues, Minneapolis, for George H. Partridge, of that city. The main portion of the building is circular in shape, sixty-two feet in diameter. This will be used as storage-room for the autos. Six stalls are provided, the machines standing on marble slabs and having at the rear of each ducts connected with pipes carrying an electric current, gasolene and compressed air. A twelve-foot turntable occupies the center of the big room, which is to be finished in white and ornamentive colored tiling. Radiators hang over every machine, and to insure absolute dryness of the atmosphere in the room, a draught pipe is laid under the floor and leads to a chimney.

At one side a wing branches off, containing the washing-room for the machines. At the other side the garage is connected by a two-story wing to the residence. In this wing will be the repair-room on the first floor and quarters for the employees of the garage on the second.

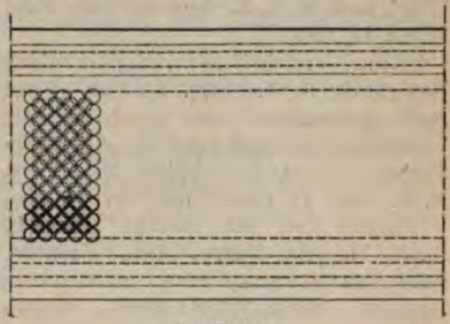
MOTOR VEHICLE PATENTS.

770,080. Device for Protecting Pneumatic Tires.—Emile Lapisse, of Elbeuf, France. Sept. 13, 1904. Filed December 23, 1903.

The protecting device is independent of the outer covering and can be located within any outer covering of usual construction. It comprises a flexible wire-gauze fixed onto a strip of canvass, leather or the like, which serves to protect the air-chamber from contact with the metal.

One important feature of the invention consists in using as wire-gauze a sort of wide chain made up of rings engaged one in another in the same manner as in a coat of mail. As this chain is not incorporated with the rubber, but is free between the outer covering and the canvas which carries it, it has much greater flexibility than wire-gauze, either woven or plaited. It is consequently much more lasting and does not wear out either the outer covering or any other part of the tire, because the meshes always remain round and even.

The two free edges of the strip of canvas are provided with fastenings by means



No. 770,080.

of which it may be fitted either against the inner face of the usual outer covering or around the tire before inserting the air-chamber between the tire and the protecting device.

769,840. Transmission Gearing for Motor Vehicles.—Chas. Schmidt, of Warren, O. Sept. 13, 1904. Filed Nov. 20, 1902.

The intermediate pinion for reversing is supported on a cradle and may be swung into mesh with the low-speed pinion and gear by a sideward motion of the gear shifting lever. The latter has a double pivot and moves on a gridiron quadrant.

769,438. Automobile Sleigh. — Francis Hartom, of Canajoharie, N. Y. Sept. 6, 1904. Filed May 3, 1904.

A driving axle provided with a sort of paddle wheel, adapted to run on the ground, is hitched to an ordinary sleigh. The paddles carry ice-engaging spurs at their outer extremities. The motor is carried on the sleigh and is connected with the driving axle by means of a chain. The driven sprocket has a universal connection

with the axle, allowing of the axle being moved for steering purposes.

770,140. Electrode for Batteries.—Albert C. Wood and James A. MacMullan, of Philadelphia, Pa., Sept. 13, 1904. Filed April 22, 1902.

This invention relates to a method of forming batteries of thin strips of lead or lead alloy, known as lead tape. The electrode comprises a sufficiently rigid framework of lead and a series of thin lead strips arranged parallel to each other and in groups separated from each other by the crosspieces of the frame. These groups are so arranged that the thin strips of one are disposed at right angles to those of the adjacent ones. To facilitate the uniform spacing of the strips and setting them in the mold both ends of each strip are folded back, and the strips are then piled one upon the other, which insures proper and uniform spacing.

769,717. Nut-Lock. Catharine Ryan, St. Paul, Minn. Sept. 13, 1904. Filed Nov. 20, 1903.

769,718.—Tire. Walter Sherbondy and Samuel H. Sturgeon, Akron, O. Sept. 13, 1904. Filed May 3, 1904.

769,789. Traction-Wheel. Warren D. Cottrell, Laurens, Iowa. Sept. 13, 1904. Filed Nov. 2, 1903.

769,975. Storage Battery. James P. Wood, Buffalo, N. Y. Sept. 13, 1904. Filed March 14, 1904.

770,101. Vehicle-Brake. Lars G. Nilson, New York, N. Y. Sept. 13, 1904. Filed April 15, 1903.

770,194. Tensional Lock for Adjusting-Screws. Charles F. Splitdorf, New York, N. Y. Sept. 13, 1904. Filed Nov. 18, 1903.

770,358. Cell for Storage Batteries. Pietro Figuccia, Boston, Mass. Sept. 20. Filed Feb. 19, 1904.

770,392. Motor Vehicle Brake. Charles Schmidt, Warren, Ohio. Sept. 20. Filed Nov. 20, 1902.

770,531. Pneumatic-Tired Vehicle. Camille Mercader, Pittsburg, Pa. Sept. 20. Filed Nov. 13, 1903.

770-567. Steering Device. William H. Douglas, Belleville, N. J. Sept. 20. Filed Feb. 20, 1904.

770,599. Heat-conducting Tube. Robert C. Monteagle, New York, N. Y. Sept. 20. Filed April 6, 1903.

770,725, 6 and 7. Running Gear. Albert F. Madden, Newark, N. J. Sept. 20. Filed Jan. 12, 1904.

770,728. Running-gear for Vehicles. Albert F. Madden, Newark, N. J. Sept. 20. Filed Mar. 10, 1904.

769,172. Rubber Tire. Alvaro S. Krotz, Springfield, O. September 6. Filed July 23, 1903.

769,243. Vehicle-Tire and Fastener Therefor. William O. Worth, Chicago, Ill. September 6. Filed Oct. 27, 1902.

769,401. Running-Gear for Vehicles. Edward J. Pennington, Cleveland, O. September 6. Filed January 18, 1904.

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The Vanderbilt Cup Race.

On the eve of the first long-distance road race in this country, we wish to again emphasize our opposition to such events. They are a detriment to the industry; a detriment to the movement; and a public nuisance. Trials of the special machines built for these races at great expense furnish practically no experimental data of use in the construction of ordinary service vehicles. The tendency in the design of racers is constantly toward machines more powerfully motored, and consequently—since the permissible weight is limited—of less structural strength. Among stock vehicles it is particularly the comparatively low-powered, moderate-priced class that requires improvement, and the principal shortcoming of this class, as a rule, is not lack of speed. It is a very easy problem to make a car as fast as the law allows it to be run, and even faster, and on the more difficult problem of how to obtain a surplus of power without prohibitive cost. the building of racing machines sheds little light, as generally no expense is spared in their construction, and materials are freely used the use of which would be simply out of the question in stock cars. Stock cars of moderate price need improvement particularly in the direction of greater reliability, accessibility and cleanliness of working parts, comfort of passengers and hill-climbing ability, and reduction of wear on tires. If a manufacturing firm engages in the construction of racing monsters, most of the efforts of its engineering department are directed toward contriving means of increasing speed, the development of stock cars suffering correspondingly.

Road racing is a menace to the movement in general, because it sets up false standards and fosters the speed craze. The speed maniac is even now the great bane of automobiling, and the racing cult will simply multiply his kind and increase the nuisance. The race is proverbially to the swift, and racing naturally develops the idea that the fastest automobile is the best, with the result that those who follow the races and are influenced by them, are constantly clamoring for speedier and more powerful vehicles. If it were possible to keep a record of all arrests for offences against speed laws, it would be found that the majority of such offences are committed with very high-powered vehicles, and in most cases it would no doubt be an easy matter to trace the owner's or driver's speeding proclivities directly to his interest in races.

The present automobile law of New York State empowers local authorities on special occasions to set aside certain sections of road for holding races, but we believe this clause is without moral justification. The public highways were built and are maintained for traffic purposes, and were never intended as sporting grounds or race-courses. In recognition of this fact, special speedways are built for speeding horses. There is no more justification for lending the public roads for automobile races—meanwhile closing them to regular traffic—than there would be for allowing ball or other games to be played on city streets. The regular users of the public roads and streets, automobilists as well as horse drivers, have the right to demand that the highways be kept free from obstruction and at all times open to traffic, except when in process of repair, etc. The population living along the course of a race of this kind is greatly annoyed by the event, except the few innkeepers who may profit by it, as was conclusively shown by the race in Ireland last year. It is the rule for the organizers of these races to issue "strict" rules forbidding driving at unlawful speed on the course before the day of the race, but common experience teaches that these rules are entirely ignored, and on the occasion of the Taunus race last summer a number of pri-

vate automobilists killed themselves, and many others wrecked their cars, in speeding over the course before the race.

In connection with the Vanderbilt Cup race, it is reported that practically all the contestants have been living along the course of the race for nearly a fortnight. The cars are mostly from 60 to 100 h. p., geared for a maximum speed of seventy-five miles and over, and if anyone imagines that they are being driven over the roads safely within the legal limit, he is sadly mistaken.

A protest against the race has been lodged with the county authorities by residents along the course, and a hearing was to be granted them on Tuesday of this week. It is not likely, however, that the event will be interfered with, as the preparations have progressed too far, and the opposition movement was started too late to develop much strength. The majority of the population in the vicinity have a very vague idea of what the race will develop, and are therefore not inclined to take a determined stand either for or against it.

Another argument against road races is the usual accompaniment of fatal accidents. It is rare that a big road race passes off without a fatality to a driver, a spectator or to an attending automobilist driving on or to the course, and if the Vanderbilt Cup race passes off without such fatalities, it will be a fortunate exception.

The English Small Car Trials.

In another part of the present issue we print a part of the Judges' report of the "Small Car Trials" recently held under the auspices of the Automobile Club of Great Britain and Ireland. Being the first endurance or reliability trials in which entries were limited to a certain range in price, these proved unusually successful and drew world wide attention. Already a movement is on foot to organize a similar event in France, and it might not be unprofitable to consider the advisability of holding a similar contest here next year. It must be admitted that the Automobile Club of Great Britain and Ireland has been the pioneer and so far the leader in the organization of practical contests, and to follow in its footsteps and hold a contest for low priced cars only would be no innovation.

There is now comparatively little need of endurance contests for high-priced touring cars, which have attained to such perfection that it has become practically impossible to arrange a contest so as to bring out the relative merits of different makes without unduly prolonging the tests and increasing the expense. The performance over a 1,000 mile course is likely to be very nearly the same for all cars, and the little differences observed will be due more to differences in the skill and care of operators than to differences in the merit of the machines. Low priced cars, on the contrary, are still in a backward state of development, and progress during the next few years will undoubtedly consist chiefly in improvements in this class—eliminating dead weight, standardizing parts and improving details.

In the different endurance contests held in this country, lower-priced cars have been poorly represented, which, considering that they were required to compete under the same conditions as the more expensive machines, is not strange, and the classification according to weight, in the earlier trials, was far from fair to the low priced vehicles. A special contest for this class of machines would be particularly appropriate in this country, which now claims a greater share of the international market for low-priced machines than any other country.

From the report on the English trials it would appear that most of the cars of English construction which competed were put together by assembling firms, and that failures were more often due to defective fitting than to faults in the parts. The same observation as regards the most frequent causes of mishaps on the road, particularly during the early period of the car's use, has been made by runabout users in this country and more careful fitting and somewhat more rigid road tests before delivery are therefore to be recommended.

The Question of Equipment.

Since the comment on the above subject in our issue of Sept. 21st we have had a number of letters from accessories manufacturers, and have been requested to discuss it further. Some of the accessories men welcome the idea that manufacturers should furnish a very complete outfit with their cars, while others are strongly opposed to it. It is evident that any decision of the manufacturers to supply lamps, horns or jacks, will not greatly affect the total sales of such appurtenances, as they are necessities and would be bought anyhow by every purchaser of a car. The decision could only affect the distribution of the orders among the manufacturers of high grade and cheap articles respectively, and would undoubtedly favor manufacturers of the cheaper class of goods. Accessories manufacturers are therefore deeply interested in this matter, and we should like to have expressions of opinion from more of them. We realize that it is a somewhat delicate question for them to discuss publicly, but it would not detract from the value of the discussion if the signatures of the letters were withheld.

The Spark Gap Device.

Since the boom in "spark gaps" has subsided and the device is found on few machines only, many automobilists seem to be under the impression that it does not offer the advantages claimed for it, and that it is really of no use on an engine. This impression is entirely wrong, however, as shown by an article on this subject in our last issue. It is absolutely certain that an auxiliary spark gap will permit an engine to run with sooted spark plugs when it would not run without it, and that the device will greatly improve the operation of the engine when there is much misfiring owing to sooting. However, the best modern engines give very little trouble from sooting of the plugs, and if there is no trouble from this cause, the spark gap is a positive disadvantage, as it increases the insulation strains in the coil, and also slightly reduces the volume of the spark. In view of these facts, owners of cars will be well advised to leave spark gap devices alone unless they are bothered considerably by sooted plugs. But if the latter is the case, they may confidently expect relief from the use of the spark gap.

Automobilists and the Farmers.

Owing to the speed excesses of some automobilists, and for other reasons which one may guess, the automobile has recently been made the target of condemnatory remarks in a number of agricultural journals, both by the editors and by correspondents. We have been favored by a reader with a number of clippings from agricultural journals published in Maine and in Pennsylvania, respectively, in which the automobile problem is discussed, apparently from the

farmers' standpoint. The writer in the Maine publication is extremely arbitrary and wants to rule all automobiles off the road. He claims that the Grange, of which organization the paper in which he writes is evidently an official organ, holds the balance of power in that State, and that it could and should have legislation adopted to prohibit the use of these machines on rural highways. We would remind this gentleman that even though his organization may hold the balance of power, that will not enable it to override the constitutional rights of citizens who may prefer to employ other means of conveyance than its members. Opinions have been rendered by several judges of the Supreme Court that the automobile is entitled to the free use of the road, the same as horse vehicles, and any law prohibiting the use of the public roads generally by automobiles would be class legislation, and therefore unconstitutional.

The writer in the Pennsylvania publication takes a more moderate view of the matter, and does not object to the use of automobiles, but only to unreasonable speeding. He anticipates the general use of these machines when mechanical power shall have become cheaper and better than animal power, and is certain that the automobile has come to stay; but meanwhile drastic measures are required to check the recklessness of some of the drivers, and this is the means he suggests:

"Every mile of road that is popular with the automobilists should be marked by a ditch cut across the road that could be crossed by any vehicle at the speed of a horse walking, but that would smash a vehicle going at a reckless pace."

The idea is not new, but has been advanced before with slight variations; it is barbarous and entirely impracticable. If automobiles were to be restricted to the speed of a walking horse, they would always remain inferior economically to the horse. In fact, the most important advantage of automobiles is their sustained speed. By this is not meant that in order to use a motor vehicle advantageously it must be driven constantly at the limit of its power, but that on good country roads, with little traffic, there is no harm in speeds up to the usual legal limit—twenty miles per hour, or thereabout. At such speeds the average car is under perfect control and can be stopped in a shorter distance than a horse going at ten to twelve miles per hour. In meeting teams on country roads, it is, of course, always advisable to reduce the gait, as required by law in some States, and almost every automobilist will do this habitually. There are, of course, exceptions among drivers who are arrogant or boorish and have no regard for other users of the highway, as there are among horse drivers. The mistake is too often made by horsemen to regard the inconsiderate drivers as typical automobilists, which is a great injustice to the automobile fraternity. The average automobilist dreads nothing so much as an encounter with a skittish horse, and frequently puts himself to much inconvenience to avoid all possibility of accidents to occupants of horse vehicles. He appreciates that he causes a good deal of annoyance to horse owners, and tries to do his share toward smoothing things over as much as possible. The inconsiderate few are denounced as much by the great body of automobilists as by horsemen, and this the latter will do well to bear in mind in considering their side of the "automobile question."

Ignition Storage Batteries.

BY ALBERT L. CLOUGH.

Although little employed in this country for ignition purposes, the storage battery is already used upon certain large touring cars which closely follow French practice, and especially upon those in which dynamos are carried. Its constant voltage within its normal discharge range, its comparatively small bulk and its very fair degree of reliability, recommend it, although the inconvenience of charging, except in the few communities where direct current is used for lighting and power, is a serious objection to its employment.

WHAT A STORAGE CELL IS.

A storage cell in its simplest form consists of two plates of lead or lead alloy carrying on their surfaces or in holes or grooves in their mass, lead compounds, the whole being immersed in dilute sulphuric acid contained in a suitable jar. Storage cells, as used in practice, usually comprise two sets of plates, all plates of each set being identical chemically and connected together. One set constitutes the positive and the other the negative element, the polarity bing dependent upon the chemical state of the lead or lead salts carried respectively upon the two sets of plates. The properties of this combination are such that when an electric current is passed through it in the proper direction, a considerable fraction of the electrical energy supplied is converted into chemical energy, represented by changes in the lead salts which are carried by the plates. This chemical energy is capable of being reconverted into electrical energy, represented by a current, at the will of the user of the cell, and its application as a source of electricity, as far as connecting it up and utilizing it, is the same as that of a set of primary batteries.

ARRANGEMENT OF IGNITION BATTERIES.

Storage batteries intended for ignition purposes generaly consist of two or three cells in hard rubber jars electrically connected, and carried in an acid proof case. As each storage cell gives about two volts, the two-cell combination develops four and the three-cell combination six volts, and thus they take the places, respectively, of primary batteries of four and six cells. These storage batteries are generally rated by their manufacturers in ampere hours, and the charge may be considered as exhausted when sufficient current has been withdrawn to reduce the voltage of each cell to 1.8 or 1.7 volts, which in the two-cell combination would be equivalent to 3.4 or 3.6 volts total, and in the three-cell battery 5.1 or 5.4 volts. When the battery is newly charged, its voltage per cell may be considerably in excess of 2 volts, possibly 2.3 or even 2:5 volts, but it soon falls to about 2 volts and remains thereabouts during the greater partof the discharge. Cells should always be recharged as soon as the voltage has fallen to 1.7 volts.

PROPERTIES OF STORAGE CELLS.

While primary batteries polarize even during legitimate use, and give a considerably reduced voltage and increased resistance after a period of hard work, possibly causing weak or uncertain ignition, the storage battery furnishes a very nearly constant voltage and offers a small and nearly constant resistance until the charge approaches exhaustion. Indeed, the resistance of storage cells is generally so small that great care should be taken that they be not short-circuited, as in case of such an accident the current flow may be sufficient to seriously injure the plates by causing them to "buckle" and to shed the lead salts or "active material" which they carry. This active material may then become lodged between the positive and negative plates, thus internally short-circuiting the cell and rendering it incapable of holding any charge at all.

INSPECTION OF CELLS.

Owing to the fact that ignition storage cells are generally sealed in their containing cases, it is not easy to inspect them. There is, however, almost always a means provided for replenishing the liquid in case of loss through spilling or evaporation. There is always a removable filling plug, and generally a rent is provided in this plug which allows of the escape of the gases that are formed during the action of the cell, but which will not readily allow of the escape of liquid through jarring of the cell. The filling plug should occasion-

ally be taken out and, if liquid has been lost through spilling, it should be replaced with dilute sulphuric acid of a specific gravity of 1.2, which corresponds to the mixture obtained by pouring one part of commercial sulphuric acid into 4½ parts by bulk of pure water. If the loss of liquid has been entirely due to evaporation, it should be replaced with pure water. At all times the upper edges of the plates should be well covered with liquid.

In case a storage battery during discharge fails to deliver its usual amount of current, or loses its charge rapidly when idle, it is usually a sign that it is internally short-circuited with active material which has been loosened by severe jarring or through a short-circuit. The best thing to do in such a case is to send the battery to its manufacturer for repairs.

CORROSIVE EFFECT OF ACID.

The connections between the individual cells of a storage battery should be entirely of lead and protected from the acid fumes which are constantly present, by some acid proof paint. Indeed, the acid spray which is produced by storage batteries when charging or doing hard work, is very destructive to any metal surfaces in its vicinity. A coating of vaseline over the binding posts and over other bright metallic parts in close proximity to the cells, tends to obviate this difficulty.

A good storage battery ought to withstand a very large number of charges and discharges, if it is intelligently handled, but at the end of a season's hard work, or if it is not to be used for several months, most manufacturers recommend that it be fully charged, the plates taken out, washed with pure water, dried and laid carefully away. The acid may be saved in glass bottles and the jars cleaned of all sediment.

CHARGING MEANS.

The question of charging and charging facilities is a most important one to automobilists contemplating the use of storage batteries. As previously stated, the direct or continuous current is absolutely necessary for this purpose, and is not always readily obtainable, as the alternating current is almost universally used for public supply outside the great cities. If one does not reside in one of the large cities where the Edison current is available, recourse may perhaps be had to some private direct current plant in a hotel, apartment house or other public building, or to an electric light station where the direct current is still produced by the exciters which magnetize the fields of the large generators. Occasionally one may chance upon the owner of an electric vehicle who has a motor generator plant for charging his own batteries. If not, a small magnet or dynamo intended for ignition purposes may be set up and connected for power driving for charging purposes. Wherever the direct current is used for lighting at a voltage of 100 to 125 volts, the charging of a storage battery is a very easy matter and, in fact, where the 200 to 250 volt system of direct current distribution is used the same procedure may be followed, although the charging will be a more wasteful process.

The only electrical apparatus necessary is a current tap or charging plug with its attached wires. This current tap is merely a plug which screws into the socket of an ordinary incandescent lamp, in place of the lamp itself. This plug carries a socket into which the lamp may be screwed, and also two screw connections to which wires may be attached for connection to the battery. When so connected, the battery is placed in series with the lamp; that is, the same current passes through the lamp and battery successively, and its volume will be dependent upon the candle power of the lamp which is used, being about one-half ampere with a 16 C. P. lamp, about 1 ampere with a 32 C. P. lamp, and about 1½ amperes with a 50 C. P. lamp at 110 volts. The charging current may thus be regulated and the light from the lamp made use of during charging.

TESTING FOR POLARITY.

It is of the first importance that the current be sent through the battery in the proper direction, otherwise the cells will be detrimentally discharged instead of being charged. The direction of the current will depend upon which one of the binding posts of the battery is connected with a certain one of the wires coming from the current tap. In order to determine the correct connection, either one of two methods may be used. A strip of red litmus paper may be moistened with water and the ends of the two wires placed in contact with it a short distance apart. If then, the current is turned on at the key of the socket, with an incandescent lamp screwed into the plug, a blue stain will be produced in the test paper under one or the other of the two wires. The wire which produces the stain should be attached to the binding post of the battery which is marked negative or —. The other wire should, of course, be connected to the positive or + binding post of the battery.

In case no litmus paper is at hand, the ends of the two wires may be immersed in a tumbler of water and held slightly separated. When the current is turned on, small bubbles of gas will be seen rising from the submerged ends of the wires, but in very much larger quantities from one wire than from the other. The wire which gives off the most gas should be attached to the battery binding post marked negative or —. and the other wire to the + or positive battery terminal. The length of time in hours which a battery should be left charging under this arrangement is generally given by the manufacturers for each size of lamp employed for the charging resistance. When the number of hours prescribed is nearing an end, it is well to watch the battery, and when, upon withdrawing the filling plugs, the cells are found to have begun to "boil" quite energetically, they may be considered as charged and the current may be cut off.

CHARGING CONNECTIONS.

When batteries are charged from the exciter at an electric light or power station it will generally be under the supervision of a skilled attendant who will use a larger charging current and complete the job in a comparatively short time. In charging from a small ignition generator, a magneto or a shunt dynamo should be chosen, and it should be run at a speed at which it will generate nearly six volts, if a four-volt battery is to be charged. An ammeter should be included in the circuit and also a length of moderate sized iron or German-silver wire, to act as a rheostat. The polarity of the generator should be determined by the red litmus paper test, and the generator wire which produces the blue stain should be connected to the negative battery terminal. The connections should not be made until the generator is fully up to speed and generating, and the current as shown by the ammeter should never exceed the rated charging current as given by the manufacturers, but may be as much less as the capacity of the generator may require. If too much current flows, a greater length of resistance wire may be included in the circuit and vice versa.

SOME IGNITION BATTERIES.

The following are descriptions of a few of the makes of storage battery designed for ignition purposes:

The American Battery Co., of Chicago, Ill., manufacture the Monitor battery of 2, 4, 6 and 8 twenty ampere-hour cells, and a type G battery consisting of either four or six cells of either thirty-five or fifty ampere hours capacity.

All these batteries are contained in enameled metal cases within which are liquid-tight, acid-proof lead linings. The individual cells are in hard rubber jars. Large gas vents are provided in the cover of each rubber jar and an automatic seal is used which prevents the escape of liquid while allowing the gas to escape.

The Champion accumulators, manufactured by Hector McRae, Baltimore, Md., are furnishing 2 or 3 cell batteries of either 20, 40 or 8 empere hours capacity. A two-cell ampere-hour capacity battery weight 12 lbs.; a three-cell eight hour ampere capacity battery, 65 lbs.; and the others in proportion. The rated charging current, upon a 12-hour basis, is 2 amperes for the 20 ampere hour batteries, 4 amperes for the 40 ampere hour sizes, and 8 amperes for the 80 ampere hour sizes. Each element of these cells is composed of two perforated, saucer-shaped sheets of pure lead, perforated with holes which are filled with active material. These two plates are placed face to face with a thin sheet of lead between them and their edges are "burnt" together. A thick plate of great mechanical strength should be secured by this construction.

Hard rubber jars are employed inside a substantial wooden containing case. The vulcanite jar covers are sealed in with cement and the terminals pass through rubber gaskets in the cover. A vent plug is used which allows of the escape of gas but which retains the liquid in case the cell is roughly handled.

The Storage Battery Supply Co., of No. 239 East 27th street, New York City, is in the market with two forms of ignition battery. The cased type, which consists of two cells in hard rubber jars, carried in a polished oak case, has e.m.f. of 4 volts and a capacity of 30 ampere hours. It weighs 22 lbs., and is 9¾" long, 4½" wide and 10¼" high over all. The two free terminals are brought out to binding posts on the wooden case. The French type consists of two cells in hard rubber jars, set up in a galvanized and japanned iron box with the cell terminals exposed. Its capacity is 60 ampere hours at 4 volts, its weight, 26 lbs., and its dimensions are 7" long, 5" wide and 8¾" high over all.

The Vesta Accumulator Co., of Chicago, manufacture an ignition storage battery consisting of cells contained in hard rubber jars carried in a wooden case. No liquid electrolyte is employed, and there is therefore nothing to spill during shipment or when the battery is tipped or jarred.

Ignition batteries are also manufactured by the Electric Storage Battery Co., of Philadelphia (described in the Horseless Age of Sept. 21 last); the National Battery Co., 253 Broadway, New York City, and the Northwestern Storage Battery Co., Chicago, Ill.

Offset Crank Shafts and Valve Cams.

Whenever a reciprocating motion is transformed into a rotary motion, or *vice versa,* and the force transmitted is greater during one stroke of the reciprocating part than during the stroke in the opposite direction, there is an advantage in offsetting the center line of rotation of the rotating part with respect to the center line of motion of the reciprocating part. This theorem applies both to the most generally used device for changing reciprocating motion into rotary motion, viz., the crank and connecting rod, and to a very familiar device for changing rotary into reciprocating motion, viz., the cam and cam follower. Both of these devices are used on gasoline engines, and as the condition of unequal forces for strokes in opposite directions obtains, one might expect the above mentioned principle generally applied in these engines, but, curiously enough, it is taken advantage of only in very rare instances. The advantage of the arrangement resides in the fact that when the rotating part is offset to the proper side, there is less side pressure on the guide of the reciprocating part, and, consequently, less loss by friction and less wear. The advantage in the case of the crank shaft was recognized during the early years of the gas engine, and applied in stationary engines to some extent. In automobile engines it has been used for many years by Charles E. Duryea, also by E. J. Phelps, and was embodied in the Mors-Gordon Bennett racers built for this year's race. The Mors Co. drew particular attention to this peculiarity in the design of their machines, and professed a belief in great advantages offered by it, and it was therefore perhaps not unnatural that when the Mors car failed to win the race, or to secure a leading place, one of our foreign contemporaries devoted more to the sporting side of the movement, reached the conclusion that the principle had proved of no value. It need only be pointed out that the causes of delay of the Mors car were tire troubles and a broken chain.

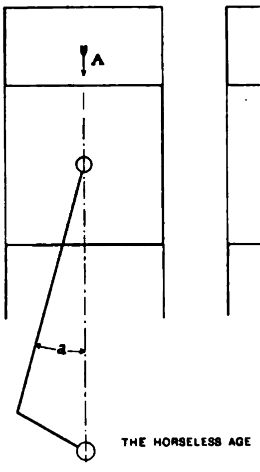


Fig. 1.

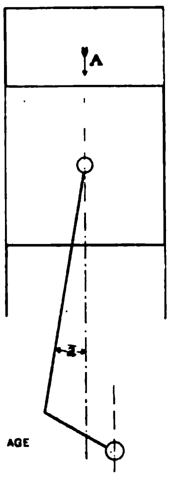
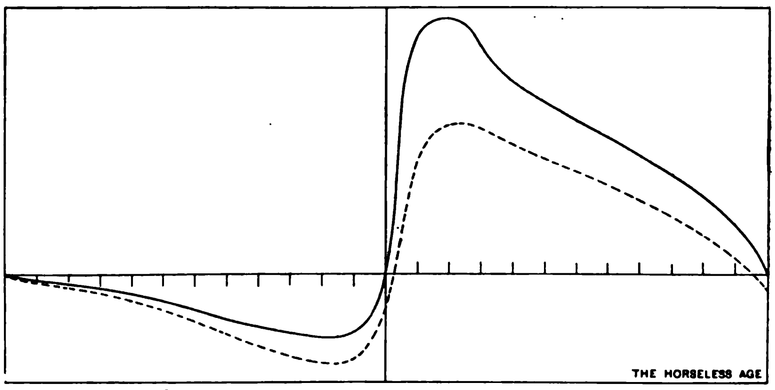


Fig. 2.

In Fig. 1 herewith is shown a single cylinder engine in diagram, with the piston at about half stroke out. Supposing that the explosion or combustion is taking place in the cylinder, and a force A is being expended on the piston by the burning gases, then there will be a side pressure against the wall of the cylinder equal to $A \times \sin a$, where a is the angle between the center line of the connecting rod and the center line of the cylinder. During the stroke in the opposite direction, when the piston is in the same position, the angle a will be the same, but the force acting on the piston (compression pressure) is now much smaller, at least four times, and consequently the side pressure, which now comes on the opposite face of the cylinder wall, is much smaller. By moving the center of the crank to the right, as shown in Fig. 2, the angle between the cylinder center line and the connecting rod center line is reduced for all positions of the downward stroke. Thus the side pressure during the explosion stroke is decreased and for the compression stroke is increased, making the two more nearly equal for any given position of the piston. It will be readily seen that when the crank is thus offset, the side pressure during a first small part of the power stroke comes on the left hand side of the cylinder wall, then passes through zero and changes to the right hand side of the cylinder wall.

In the diagram Fig. 3 herewith are plotted curves of pressure on the cylinder wall for an engine with cylinder and crank shaft in line, and for an engine with crank shaft offset one-sixth of the piston stroke from the center line of the cylinder. The curve for the former arrangement is shown in full lines, and that for the latter in dotted lines. The curves show the pressure during the compression stroke and the power stroke. During the compression stroke the pressure comes on the opposite side of the cylinder wall as during the power stroke, and the curve for it is therefore drawn below the neutral line, indicating negative pressure. These curves are based on an actual indicator diagram taken on an automobile engine running at 800 r. p. m., and on the supposition that the connecting rod is twice the length of the piston stroke. The scale is, of course, arbitrary. From the curves it will be seen that by offsetting the crank shaft one-sixth of the piston stroke, the maximum side pressure during the power stroke is reduced about 40 per cent., and the maximum side pressure during the compression stroke is increased 38 per cent. The maximum variation in pressure is reduced about 25 per cent, so there ought to be much less vibration with the offset crank. One peculiarity of the offset crank engine is that the side pressure on the cylinder walls does not change in direction when the piston is in the dead center position, but a moment later, when the connecting rod is in line with the piston.

It will be noticed that the side pressure



Compression Stroke. Power Stroke.

Fig. 3.

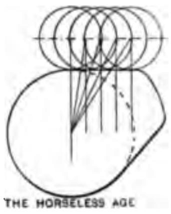


FIG. 4.

with the offset crank is still considerably greater during the power stroke than during the compression stroke, but we do not believe it advisable to offset the crank more than one-sixth of the stroke, as difficulties would arise from the great angularity of the connecting rod during the return stroke, the rod probably requiring to be made longer.

In laying out the valve operating mechanism of gasoline engines, it is usual to place the center of rotation of the cams in line with the center of the valve stems or their push rods, and to make the beginning and end of the cam surfaces tangent to the cam circle, as shown in Fig. 4. When the cam roller rolls up this inclined surface, the direction of the pressure transmitted is shown by a line drawn through the center of the roller and the point of contact, while the relative angular position of the push rod is indicated by a line drawn through the center of the cam roller and the center of the cam. It will be seen from Fig. 4 that as the cam roller mounts the inclined cam surface the direction of the pressure assumes constantly greater angularity to the direction of the push rod; in other words, a constantly growing component of the cam pressure is exerted sidewise against the push rod guide, causing friction and wear. In Figs. 5 and 6 is shown how this trouble can be partially remedied by offsetting the cam. In Fig. 5 the cam is arranged directly underneath the push rod, or in line with it, and the angle between the direction of the pressure on the cam roller, and the center line of the push rod is marked *a*. In Fig. 6 the cam shaft is offset a little over one-half the cam lift, and the cam is shown in a position corresponding to the same valve lift as in Fig. 5. It will be noticed that the angle *a* is now very much smaller.

While the angularity between push rod and cam pressure is thus reduced for the lifting portion of the cam, it is simultaneously increased for the "seating" portion, but this is of no great moment, as when the valve returns to its seat there is much less pressure between the cam and cam roller than when the valve is lifted. While the valve is lifted the cam must overcome the combined pressure of the valve spring and the inertia of the valve, while when the valve returns, the spring force and the inertia of the moving mass partly neutralizes each other, and only the balance appears as pressure on the cam surface.

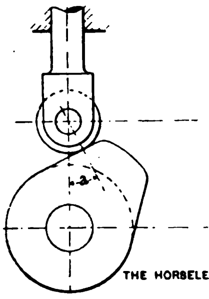


FIG. 5.

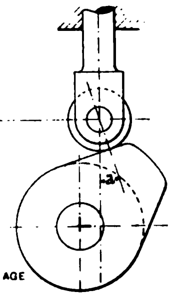


FIG. 6.

When the Daily Press Gets Technical.

The following is from a description of one of the cars to start in the Vanderbilt Cup Race, which apeared in the *Brooklyn Eagle* of Sept. 26:

"Ball bearings are used in the blocks and perfect lubrication is secured to every part of the gear. It is attached to the main frame by cross transverse stays. The ignition is a magneto gear driven with provision to test the sparking in each cylinder separately by a simple cutting-out device, which consists in the rotation of a slotted fibre disc, and around which the connections are made.

"The water circulation, of which the pump forms a part, is considered absolutely perfect. Free ingress and egress of the water is secured at every part of the motor and radiator and it is possible to run over 1,000 miles without using a glassful of water."

The only blocks on an automobile, so far as we know, are the spring blocks, and the vehicle therefore seems to have ball-bearing springs. It is not quite clear whether it is the "provision to test" or the cutting-out device that consists in "the rotation of a slotted fibre disc." That the pump should form part of the water circulation seems odd, and one might anticipate interference with the cooling of the motor, but all such fears are dispelled by the assurance that the circulation is "absolutely perfect." A more serious matter, however, is the fact that the water has free ingress and egress at every part of the motor, as this cannot fail to affect the ignition.

Results of Army Motor Wagon Trials.

The experiments with military motor-wagons made during the Italian army manoeuvres, resulted favorably. The starting point was Brescia, and the cars went out in all directions, some going up mountains to heights that carriages rarely reach, and this in comparatively little time. From a strictly military point of view the most interesting experiment was that of transport. A motor-omnibus carried sixteen armed soldiers for thirty-eight miles in hilly country in two and a half hours, while two others took heavy loads of biscuit and flour up mountains without the least mishap, proving their utility beyond dispute.

TOURING ROUTES

A White Mountain Tour.

By L. E. French.

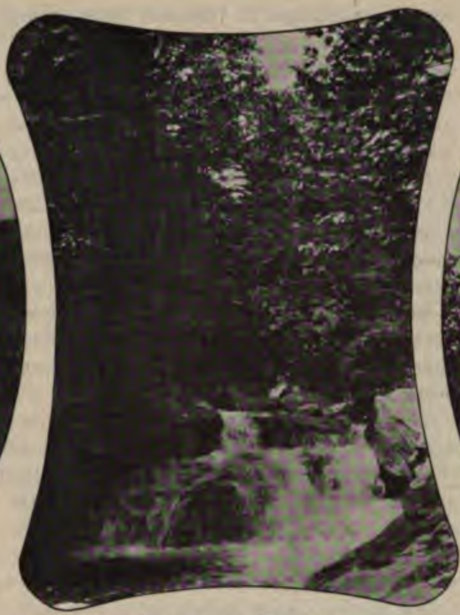
During the long, cold winter months, when the automobile is hibernating, the impatient enthusiast can do little but dream and make plans for the future. This is what Mr. Gaylord and I did the past winter, making plans for a tour through the White Mountains. Thus it happened that when the longed-for summer finally arrived we had everything in readiness for the trip. Our double-cylinder, three-speed machine was equipped with everything necessary in the way of a repair outfit, and as it was provided with a top and we carried numerous rubber blankets and curtains, we felt that we were thoroughly fortified against the weather.

The start for the mountains was made from Springfield, Mass., Friday, July 22, the first day's run proving exceedingly uneventful. We passed through Worcester, Groton and Nashua, putting up for the night at Manchester.

The next morning we were disgusted to find it raining, but the alternative of running through the rain or lying around in a hotel did not require a second thought, and we got out the rubber blankets. All that day we traveled through the rain with the drizzle blowing in on our faces. The roads were fairly good at first but became sandy toward night and the grades increased as we approached the mountains. As darkness came on, we stopped at a small town to light up, and while Mr. Gaylord loaded the generator I went in search of gasoline. I finally succeeded in getting some, but not until it was safely in the tank did I discover that we were in the jaws of a gasoline shark. We did not escape without a fine of forty cents a gallon. Pushing on through the dark, we stopped now and then at a signboard to discover the road, until finally we reached Conway, at eleven o'clock, and were glad to put up the machine for the night.

Conway proved so attractive that we spent some time there, meanwhile taking short trips to the neighboring points of interest. One of these expeditions proved exceptionally eventful, since in the short distance of twelve miles, we had a greater number of mishaps than at any other time during the tour. There was to be a circus at North Conway. Under ordinary circumstances this would not have aroused any great interest, but the season in the mountains was an unusually dull one, and anything in the way of a diversion was welcomed as a great event. Accordingly, Mr. Gaylord and I invited two young ladies to accompany us to the circus. We were to leave Conway at 9 A. M. in order to arrive at North Con-


Mt. Washington from Below the Glen.


Above the Pool.


The Old Man of the Mountains.


Echo Lake and White Horse Ledge.


Mt. Washington from Kearsarge.


A Plunge Through the Woods.


Echo Lake.

way in time to take in the parade. Promptly at nine on the eventful day we went to get out the machine, only to discover that one of the rear tires was flat. There was nothing to do but to go at it, so we took off our coats and started in. After some delay we got a new inner tube snugly in place, but were just one hour behind the appointed time when we stopped to take aboard our fair companions.

All went smoothly for several miles, when we were suddenly startled by a splintering sound under the seat. A hasty examination disclosed the fact that the high-speed fibre gear had stripped. After a little consultation we decided to continue to North Conway on the intermediate gear, and started. The din underneath, however, made any further conversation impractical. Upon arriving at Echo Lake, we concluded that a little application of the hand Sapolio, carried in the hood, might improve our outward appearances, so we left the machine by the roadside and Mr. Gaylord and I were soon "spreading oil on the troubled waters" while the ladies admired the beauties of "White Horse Ledge." Some inquisitive persons happened along just then and asked us why we had not run the machine down to the shore of the lake. We replied that we should have done so, had it not been for the possibility of frightening the "White Horse."

While returning to the machine, my attention was called to the large number of luscious blueberries growing by the path. I stopped to cut a few of the bushes, and in doing so the knife slipped and I gashed two of my fingers. This afforded one of the young ladies an opportunity to perform a little bandaging operation, for which she sacrificed a dainty pocket handkerchief. North Conway was finally reached without further incidents. The parade was over, but we were just in time for dinner. Before eating, however, we telegraphed for a new set of fibre gears.

Several hours later we were again in the machine, this time headed for Conway. The high-speed gear rattled like a junk-shop on wheels. The noise proved so distressing that when within a mile of Conway one of the party was taken sick. During the momentary delay which ensued, a couple of drunks dashed past in a buggy, cursing like demons and lashing the horse into a lather. Upon reaching Conway, Mr. Gaylord discovered that he had lost a valuable gold pin, so that altogether we had quite an eventful day.

Just how much work it would be to replace the broken gear we did not know, but started in early the next morning to find out, and after several hours' labor, everything was in readiness for the new parts. A whole new set of fibre gears had been ordered, but we only intended to replace the high speed and the intermediate. The new gears, which were made of rawhide instead of fibre, arrived shortly and we soon had them in place.

The next morning dawned one of the clearest days of the season, so we decided to take advantage of this fact by climbing Mt. Kearsarge. This mountain being only a few miles from Conway, the trip was an easy one, and we soon found ourselves beginning the ascent. The climb of 3,200 feet was a comparatively short one, but very steep. Notwithstanding this fact, we made the ascent in one hour and twenty minutes, passing seven climbers on the way up. The view at the summit fairly repaid our exertions.

To the west the Presidential Range lay spread out in all its grandeur, with a stray cloud now and then obscuring the summit house on Mt. Washington.

To the south the eye roved over countless mountains; in fact, the whole country to the south and west reminded one of the surface of a seething cauldron suddenly solidified and cooled. Toward the north the peaks faded away, and as one looked east the eye scanned the broad, comparatively level country, broken here and there by little hills. After enjoying the sight for more than an hour, we "came down to earth again" very well pleased with the trip.

Shortly after this we bade Conway farewell and turned our faces toward Mt. Washington, determined to find out what advantages the White Mountains offered to the automobilist. The first place of interest which we passed through was Jackson. We stopped long enough here to see the falls and to frighten a few horses.

Let me say right here that automobiles seem to exert a wonderfully rejuvenating influence upon the White Mountain horses. Even the most ancient animals apparently go into a trance in which they have the most violent visions of their younger days. The occupants of the vehicle, who in most cases have been worrying for hours over the prospect of meeting an automobile, naturally catch the general excitement, and panic reigns. Under these circumstances we soon adopted the policy of stopping whenever a "hay motor" hove in sight, and remaining stationary until it was out of sight. It quite frequently happened that as we wended our way through some wooded lane, a horse-drawn vehicle rather unexpectedly appeared. The occupants almost invariably leaped as if shot, uttered sounds indicative of human agony, and waved their arms above their heads. The horses, startled by the unusual sounds and the appearance of the machine, promptly began vaudeville imitations of the St. Vitus' dance, interspersed with touches of the Highland fling. About this time the ladies of the party generally forgot all conventionalities and began leaping from the vehicle like grasshoppers from a hot saucepan.

To return, however, to the narrative. We left Jackson, and after a fascinating ride, abounding in beautiful mountain scenery, we passed through Pinkham Notch and finally arrived at the Glen. Here we put up the machine, and after dinner climbed Mt. Washington on foot, by the carriage road, making the ascent in three hours and twenty-five minutes. We spent the night on the summit. Looking from the window in the early morning, I saw an unusual sight, for a violent thunderstorm was in progress below. The moon shining overhead gave enough light to enable me to see great black masses of cloud scudding past the platform like huge whales. Then a distant flash of lightning struck down into the valley below.

The next morning we returned to the Glen House, and after dinner resumed our journey, passing through Gorham and Gorham Station, heading meanwhile for Bethlehem. The country in this locality is very picturesque and is certainly not burdened with many great centers of civilization, as we soon came to realize. For some time we had been traveling through a rather lonely region, alternately passing through sections of forest and over level stretches, where imposing views of Mts. Jefferson and Adams presented themselves.

Suddenly the road made a very abrupt descent into a little gully, only to ascend sharply on the opposite side. When half-way up this pitch there was a ripping crash underneath and we hastily brought the machine to a standstill. Mr. Gaylord and I cast significant glances at each other as we hastily removed the seat cushions, trying meanwhile to hope that it was not one of the gears; but it *was* the gear, and, worst of all, the low gear that had stripped. When this alarming fact had been discovered, we glanced hastily around and took in the situation. The machine was standing in the middle of a short but steep hill, up which there seemed to be no prospect of climbing. To run backward, however, would be worse than useless, for the hill we had just come down was steeper than the one on which we were standing. There seemed to be no available help within miles, for indeed we had reason to believe that we were in one of the loneliest sections of the mountains. All this passed through our minds as we gazed from the broken gears to the wood-covered slopes of Mt. Adams.

"We're certainly up against the real thing this time," Mr. Gaylord remarked. "What shall we do?" After a little consultation we decided that the first thing to be done was to get the machine up onto level ground where the intermediate gear might be available. Accordingly, we began looking around for something to pry with, but could find nothing. Then we went to the rear of the machine and tried pushing, but we might as well have pushed against the side of a house. Finally, we each took hold of a wheel and found that by straining every nerve we could move the machine a few inches. Taking off our coats, we went at it and hitched the car up the hill inch by inch, until at last we had it standing on level ground. Then we started the engine, and after setting the machine in motion by

, we threw in the intermediate, and, aboard, went rattling down the road, thankful to allow the engine to do k. Just how far we traveled in this lo not know, but presently a steep oomed up ahead and we made a r it. Just half-way up this hill the stopped and we knew that it was no the machine was carefully backed nd run to one side of the road. as certainly necessary this time, but we would have to go to get it was of conjecture. Jefferson, the near-, was, as we discovered later, fully s away.

on as we comprehended the situa-r. Gaylord started off in search of ile I remained in charge of the Left to myself, I made every prep- for a lengthy wait, three or four t least, and that would make it 10 The shadows, which were already g to fall, were depened by the oods through which the road had at this point. The silence was only by the buzzing of mosquitoes.

e long I heard voices coming down d, and soon two horses came in llowed by two men, three boys and

ss this is the place," one of the men d, as they came down the hill. I ighted at the pleasant surprise of short wait, and soon had the chains to the front axle. Fifteen minutes machine was ensconced in an old ile I was lying flat on my back un-, getting things in readiness for the of the countershaft. Mr. Gaylord e ahead to telegraph for the low hich we had, unfortunately, left at . Soon he returned with the infor- that there was no telegraph office our miles; that it would be possible one a mesage to Lancaster, but the s closed for the night.

s come and have supper now," Mr. added mysteriously, as he started e road. Where we were going and I had not the slightest idea, until e suddenly out of the woods and urselves only a few steps from the ms House. This was a small but nfortable hotel, which seemed to be d despite the backward season.

anxious to travel light, and imag- at we were to take a trip through ds, we had unfortunately left our othes at Conway. Under these cir-ces our external appearances were e all that might have been desired t. Adams House, but we made the t and resolutely entered the dining- The ladies at our table glanced at r coldly and before long the gen- nquired:

you tramping through the moun-

" I replied, "we are not yet reduced unfortunate condition, but we may e long if we don't get a new gear for our auto." That magic word auto, so short in itself and yet at times expressing such volumes! The ladies at once lost their frigid looks and became quite affable, while the gentleman waxed confidential.

"It looks good to see some young men here," he said, "I have felt like a Brigham Young among all these ladies." We looked hastily around at these words, and, sure enough, with the exception of Brigham Young, we were the only gentlemen present, although the room was well filled. A second glance, however, revealed the fact that most of the ladies were all past the charming age of sweet sixteen. There were, however, several young ladies at the hotel to whom we were indebted for the pleasantness of our stop at the Mt. Adams House. The next morning we telephoned a telegram to Conway via Lancaster; then walked eleven miles to get a shave. After dinner we tackled the auto, and everything went smoothly until we came to the removal of the driving sprocket. When this had been supported on irons, we protected the end of the shaft with a hardwood block and vigorously applied first a hammer and then an axe. Finding this useless, we carried the shaft a quarter of a mile to an old blacksmith shop. The blacksmith, of course, was not at home, and his shop looked as if he had not been there for at least five years. We succeeded in unearthing a fifteen-pound sledge, and for fifteen or twenty minutes we smashed away without success. Finally, I waved the sledge around my head in a supreme effort and brought it down with a crash that shook the shed; the sprocked slipped easily off and the day was ours.

The gears did not come until the evening of the second day, but we borrowed some lanterns, and two hours later the machine was ready to run. The gentleman who towed us up the hill and gave us the use of his barn for two days and three nights refused to take a cent from us. This was quite a contrast to the Glen House, where we paid a dollar merely for the privilege of allowing the machine to remain under cover overnight.

(To be continued.)

California—An Automobile Nirvana.

By W. W. Everett.

From the East to the West—from New York to San Francisco—the pleasures of autoism have gradually overcome the prejudices of an appreciable quota of the populace. Five years ago there were perhaps but thirty machines—all of the poorly constructed steam runabout type—in the vicinity of San Francisco. The close of 1904 will find over a thousand automobiles in general, generous use in the same locality. And why? Because this rapid growth is due entirely to the excellent touring facilities, encouraging roadways and auto improvements, which have tended to heighten the intensified interests of the sport-loving people of California.

It has been a most difficult matter for the automobile salesmen to overcome the prejudices of those who owned the small pioneering steam runabouts and those also of the friends of these early owners. It has taken years to efface the memories of the range of expensive repairs and the attendant delays which caused the general disatisfaction that existed in those days. Then it was that owners were happy when they secured a purchaser for their slightly used machines, no matter what the pecuniary loss incurred. To-day, however, all this is altered, for the improvements have been legion. The manufacturers have placed upon the market the light and heavy touring cars. With the latter's advent have come fewer repairs, shorter delays, increased power and capability to partake of and enjoy longer country touring trips. Akin to the advance from the horse car of the city's streets to the rapidly moving trolley car transportation facilities has been the development of the splendidly constructed gasoline automobile, from the cheap, spindly, troublesome steam machine of 1900. There is one thing an automobile manufacturer and an automobile purchaser must have deeply impressed upon their gray matter, and that is, do not send to, and do not try to bring into use in San Francisco any machine that is not strong enough in its structure to stand rough pavements or roads and in its power to negotiate the hills of that city.

To be an automobile monomaniac of the first order in California, one must be the proud possessor of an automobile, be it ever so humble in its pretensions. There is a thrilling "world is yours" sensation in connection with such an ownership that is not at all comparable with that of any other mode of locomotion. What wonder then, in all leisure moments, that the enthusiast arrays himself in the peculiar, disguising garb of his ilk and battens down for a tussle with the elements and proceeds to lose all sense of time, place and occupation in the pleasure, anticipated and actual, of an out-of-town tour. For the lover of Nature's al fresco fetes, or the prosaic individual who merely loves to annihilate space, there is an allurement which belongs solely to this fast-developing sport. And the Golden State affords the most varied possibilities to the true enjoyment of automobiling.

Distances are expansive in California. The roads are of all classes, from excellent to poor, but the automobile covers them from one end of the State to the other without hesitation. Odious are comparisons between the roads and thickly populated conditions of rural Europe, where the national governments care for the by-ways in every district, and the roads in this western land of romance, of sunshine and picturesque attractions. There is not a single por-

tion of this State that does not afford an interesting terminus for an automobile trip, no matter whether it be one of a day's passing from the thickly populated streets of this metropolis.

There is an astonishing variety in scenic tones, while the concurrent difficulties encountered on the road are as nothing to the traveling motorists. The highways are always passable, with reservations for an occasional stretch of adobe met with during or immediately following a winter's rainstorm. As to the byways, the power of the touring car forms the equation of possibility. The motorist can always beat a retreat, with no feeling of ignominy or loss of glory, when he encounters a *cul de sac* or a sample of the perpendicular awaits his venturesome attempt. It is a questing spirit, however, which incites the auto-rover to investigate every byway and unbeaten path, since it is along these that the real delights hide themselves. The road maps are the guide-posts during the long State-wise tours, but, unfortunately, the early stages of motorism have not as yet permitted the publication of these essential factors in thoroughly successful long-stage trips. The country people are anxious and willing to aid the driver in maintaining the correct route and in supplying whatever essentials he may need in oils and water and whatever else they may have at their disposal. California's good fellowship is found from one end of the commonwealth to the other, and where it is not discernible, it can be placed to the account of some motorist who failed to realize that there were others in the world than himself. Right here it is only just to state that the general corps of automobile owners are taking steps everywhere to uphold the truest feeling of co-operative driving, and seldom, if ever, do you hear complaints from the countryside.

With a 12-h. p. car nothing is impossible in California. Much is to be enjoyed in even one of only 6 h. p. It is not wise, however, to purchase a touring car of less than 12, for the autoist always desires to feel that he has plenty of power up his sleeve to be utilized in an emergency, such as fording a creek where he can secure no run, in order to carry the graded bank on the opposite side. The strain of driving is entirely eliminated in an adequate powered machine, and the tourist does not need more than six weeks' experience to fully maintain this contention. The salesman may endeavor to convince you to the contrary, but pay no attention to his argumentative premises, but listen to the experience of those who have driven the necessary experimental years.

California abounds in beautiful touring possibilities. Perhaps the longest single, continuous trip is from San Francisco to the southern boundaries of the State. These tours can be taken easily and prove most delightful in every respect. The roads are good, with only two or three unfavorable stretches en route. The road covers a distance of about 489 miles from end to end, and should be negotiated in about four stages in order to obtain the best recreation. The machine can leave San Francisco on Monday, for instance, reaching San Juan easily, the next day negotiating Paso Robles over the San Juan and Jolon grades. Wednesday would find the auto at Los Olivos, while Santa Barbara would seem the conclusion the following day. Numerous detours can be taken during the run down the State, while the scenery is magnificent from start to finish. The automobile encounters a change with each mile, and those who have been fortunate enough to cover this distance are extravagant in their praises of California's auto possibilities. Everywhere gasoline and water can be secured in passing, and there are no obstacles to mar the supreme enjoyment of the journey.

This is only one of several long-distance tours. There are others that have been made into the Yosemite and the mountain districts of the coast and higher Sierra ranges. The summer just closing has seen many automobile parties on the roads and byways, bound for the districts where the most picturesque conditions are to be met with. But all of the pleasures of California motoring are not to be found in these long trips. Flitting one and two day trips can be enjoyed in abundance in and around San Francisco. The beauties of the picturesque scenery to be found within forty miles of the metropolis, the redwood forests of Humboldt and Mendocino and Santa Cruz counties are as open volumes of an auto Baedeker, but their scenic effects can be found in shorter tours. The chuff-chuffing of the auto-car carries you along the Bay or Mission roads to the well-known Fourteen-Mile House, in San Mateo county. Turning off this main thoroughfare at the end of its confines, you start up the slight grade to the summit of the first range of hills, where a magnificent panorama unfolds its natural beauties to your keen appreciation. On the left will be the great bay, with its small sailing craft flitting over its whitecapped waves, while on the right you will be greeted with the smooth surface of Lake Andreas, one of the sources of the water supply of San Francisco. Glistening in the partly shadowing protection of the tree and fern-lined hills, there is no more beautiful scenery to be found in California, the great State of picturesque attractiveness. The onward road winds slowly down on the left banks of the lake and with each turn spreads before you the attractions that have made California called the Switzerland of America. It all brings to mind the May song of Hood:

"'Tis like the birthday of the world,
  When earth was born in bloom;
The light is made of many dyes,
  The air is all perfume.
There's crimson buds, and white and blue,
  The very rainbow showers
Have turned to blossoms where they fell,
  And sown the earth with flowers."

One is prone to linger here until the shades of twilight cover all the poesy of nearby Nature with its re-invigorating nighttime quietude, and then the road is taken further toward the south.

Passing through lanes of beautiful greenery, crossing the small spring rivulets, pausing to pluck here and there the purple iris and the wild sun-flower daisies, you gradually wend your way until the great Crystal Springs Dam forces itself on your vision. The road has held you in its hypnotism of Nature, and you leave its influence with a feeling that the sordidness of urban life hold out no attractiveness for the homeward journey.

This is a single trip on the San Francisco side of the Bay. There are many others, but on the Oakland confines you find many and diverse short trips which hold forth the strongest inducements for automobile excursions. The photographs cannot display the attractiveness of the Niles Canyon tour. But twenty-seven miles from Oakland, over a road that is famous the length and breadth of California for its billiard table surface, you reach the commencement of the canyon is less than an hour. Passing the old-time town of Niles, you turn to your left and emerge in a half mile into a seeming solitude of ferns and trees and flowers. Down through the centre of the ravine tumbles a small river, which dashes over the channel stones with issuant murmurs of unrest, and along its sides you cover a roadway which is level on its gravelly surface, with only a slight imperceptible gradient. In the warmest weather you ride under the cooling spread of the boughs, while the whole canyon effect is one of deep peacefulness and satisfaction. Wending your chuffing way slowly up the stream, here and there you are greeted with the merry calls of those who are cooling themselves in the waters of the Creek Alameda or listen to the calls of the jolly, wandering country folk, who can be seen whiling away their satisfying Sunday vacation under the spread of the oaks and willows. There is a sense of isolation from all the troublesome features of life, and when the hour comes to travel cityward, you envy those who live nearby and wonder what Sunday or holiday will allow you to motor to one of California's typical localities.

These two trips can be taken as samples of what California and the district of San Francisco hold forth to the automobile enthusiast the year round. Small wonder is it that the Eastern visitor who has once taken such holidays as these feels that no matter of entire living satisfaction can be his until his household Lares and Penates are removed to the shores of the Golden Gate and he commences to live as only those who can feel the invigorating influences of California.

New Vehicles and Parts

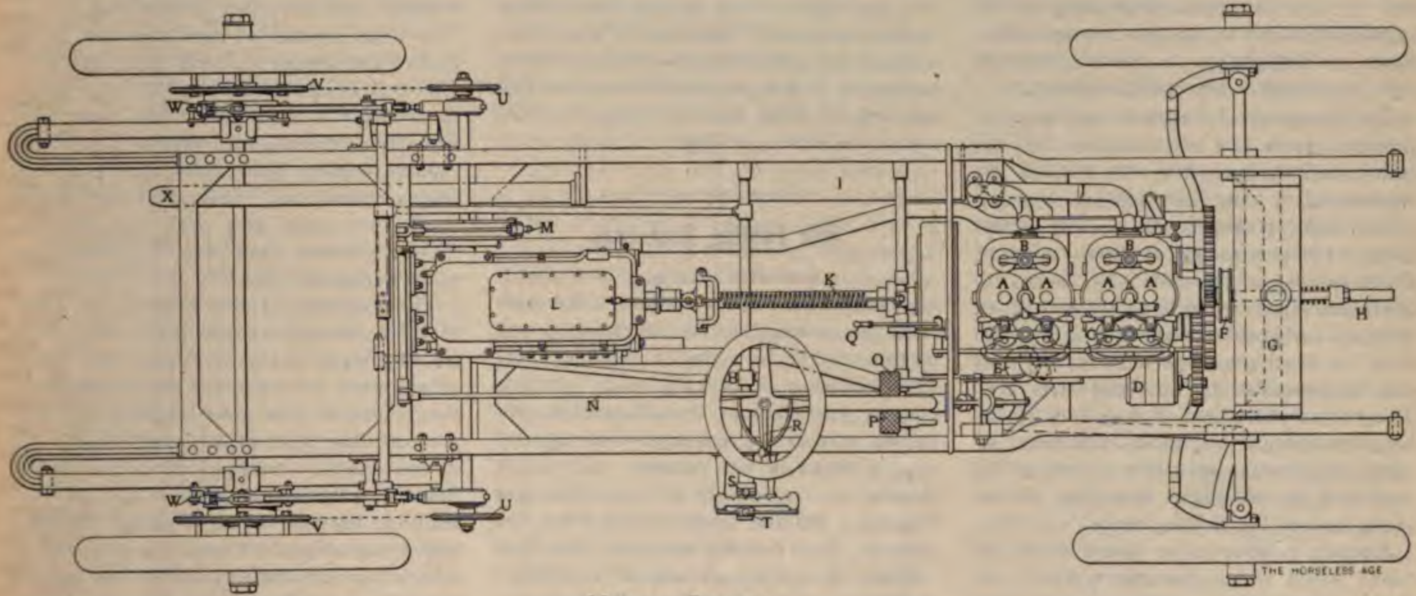
The Martini Car.

We show herewith a photograph of the new 18-22-h. p. Martini car, made by F. Martini & Cie., the small arms manufacturer of Switzerland, and now handled in this country by Palmer & Christie, 239 W. Fiftieth street, New York City.

As will be seen from the picture, the general design of the car is along the lines of common practice in the construction of cars of its class, *i. e.,* the motor, which is of the four-cylinder vertical type, is located in front of the dash and delivers its power to the road wheels through a coupntershaft and side chains. It is mounted on a secondary or sub-frame which extends back to the countershaft and carries the change gear and differential box as well. Both this and the main frame are constructed of stamped steel; the latter being bent so that it is narrower at the front than at the rear, thereby increasing the amount of movement possible for the steering wheels. Semi-elliptic springs are fitted throughout. The wheels are of the artillery type, 34" diameter, and mounted on ball bearings. The wheel base is 8 feet 6.4 inches, and the gauge 4 feet 3.2 inches.

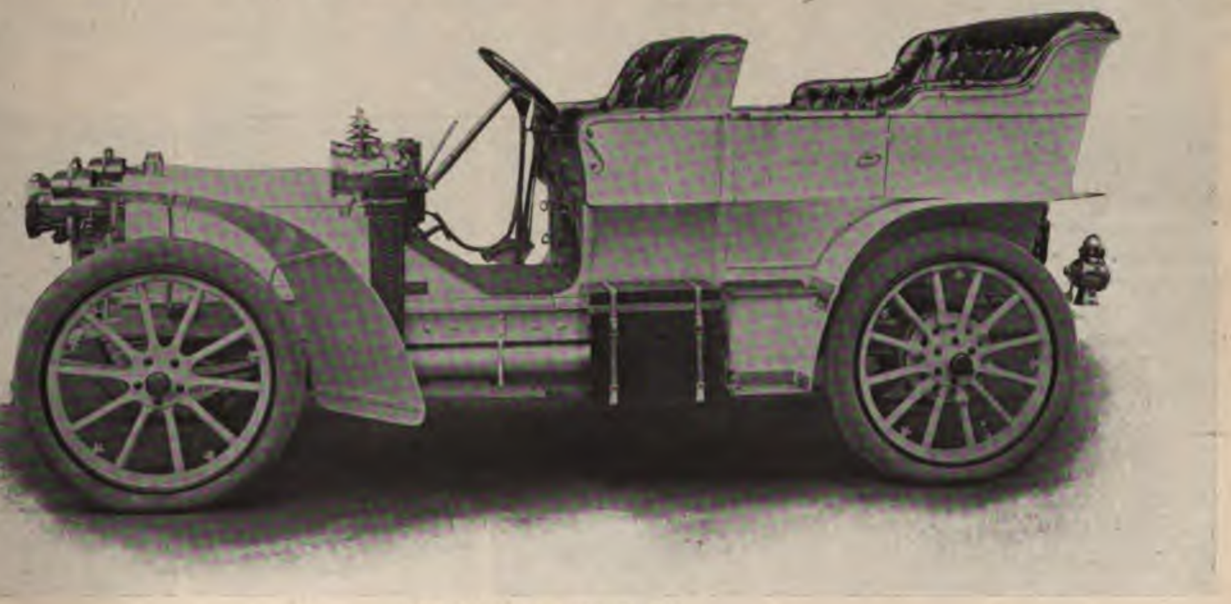
The cylinders of the engine are cast in pairs, having the heads integral with the cylinder walls, and are water-jacketed for the entire length of the piston stroke. The valves are all mechanically actuated and are located in posts formed on opposite sides of the cylinders. A separate exhaust and inlet pipe is supplied for each pair of cylinders. The valve cams and shafts are made in one piece and run enclosed in an extension of the crank case. The carburetor, which is fixed to the motor and is provided with a jacket through which exhaust gases pass, is so constructed as to provide for automatic regulation of the proportions of gasoline and air drawn into the cylinders at the varying engine speeds. A ball governor is attached to one of the half-time shafts which acts on a throttle and can be controlled by a hand lever on the steering wheel. It is said that the engine speed can be varied from 200 to over 1,000 r. p. m.

Ignition is obtained by means of the Simms-Bosch low tension system with slow speed rotary magneto and the timing of the spark is variable at the will of the operator by means of a small lever attached to the dash. The lubrication of the motor is ac-



MARTINI CHASSIS.

AAAA, engine cylinders; BB, exhaust valve chambers; CC, spark fittings; D, magneto; E, carburetor; F, fan pulley; G, radiator; H, starting handle; I, muffler; JJ, exhaust pipes; K, clutch spring; L, change gear case; M, transmission brake; N, transmission brake connecting rod; O, clutch pedal; P, brake pedal; Q, ignition timing lever; R, throttle lever; S, gear changing lever; T, hub brake lever; UU, sprocket pinions; VV, chain wheels; WW, hub brakes; X, muffler discharge.



THE MARTINI 20-H. P. CAR.

complished by a force feed system provided with sight feed drips, in which the pressure of the exhaust is employed to drive the oil to the various bearings. A hand pump is supplied, by means of which extra quantities of oil can be forced into the crank case, if this becomes necessary for any reason. A compartment for petroleum, for cleaning out the cylinders, is provided in the oil tank and a separate hand pump is fitted for this purpose.

The cooling water is forced through the cylinder jackets and the honeycomb radiator by means of a gear-driven rotary pump and fan, driven by a wide leather belt, is placed immediately behind the radiator to produce a forced draught through the tubes.

The friction clutch is leather faced and slightly conical in shape. It is formed in the flywheel in the conventional manner and is operated by a foot pedal. The spring which holds the two frictional surfaces in engagement is entirely exposed and can therefore be readily adjusted.

The change speed, bevel driving, and differential gears are all contained in one case, which is located at the rear of the sub-frame. A long shaft, fitted with a universal joint, transmits the driving power from the clutch to gears within this case. Four speeds are provided by means of clash gears nad a jaw clutch for a direct drive on the fourth speed. The differential is of the bevel gear type with four pinions and is surounded by a forged steel case. The countershafts run in four sets of ball bearings, those at the outer ends being located close to the sprockets to reduce the likelihood of the shafts springing because of the pull of the driving chain.

Steering is effected by means of an inclined wheel which operates a worm and sector combination. Mounted upon this wheel is the small hand lever which varies the action of the governor and thereby regulates the speed of the motor. Two foot pedals are located at the base of the steering column, one of which operates the clutch and the other a double-acting, water-cooled brake on the countershaft. The change gear lever and hand brake are located at the right of the operator and stand about midway between the dashboard and the front of the seat. The hub brakes are double-acting and are of the external band type, metal on metal. When they are applied, the clutch is automatically thrown out. The foot brake is not interconnected with the clutch, it being claimed by the makers that in descending long hills it is desirable that the engine be used as a brake and thereby avoiding a certain amount of heating and wear. If the clutch is disengaged this cannot be done. A pawl and ratchet combination on the countershaft serves the purposes of a sprag, and is controlled from the operator's seat by means of a small lever.

To the châssis, which weighs about 1,500 lbs., any type of body desired can be fitted by the purchaser. The standard type, however, is the side entrance tonneau shown herewith. It is expected by the agents that the first of these cars will arrive in this country in about ten days.

Artz Folding Rear Seat.

We show herewith some photos of a folding rear seat for vehicle bodies, more especially for automobile bodies, invented and patented by J. D. Artz, of Dayton, Ohio. The following claims are made for this seat by its inventor: It is simple in construction, is strong and rigid when up, and can be closed in two seconds; the vehicle then has the appearance of a two-passenger runabout, and the cushions and robes are protected from dust and moisture. The illustrations show the seat applied to a Ford runabout, but it is equally well adapted to be fitted to Cadillacs, Oldsmobile Tonneaus and other cars that do not have the rear portion otherwise occupied. We are told that Mr. Artz intends to manufacture these seats.

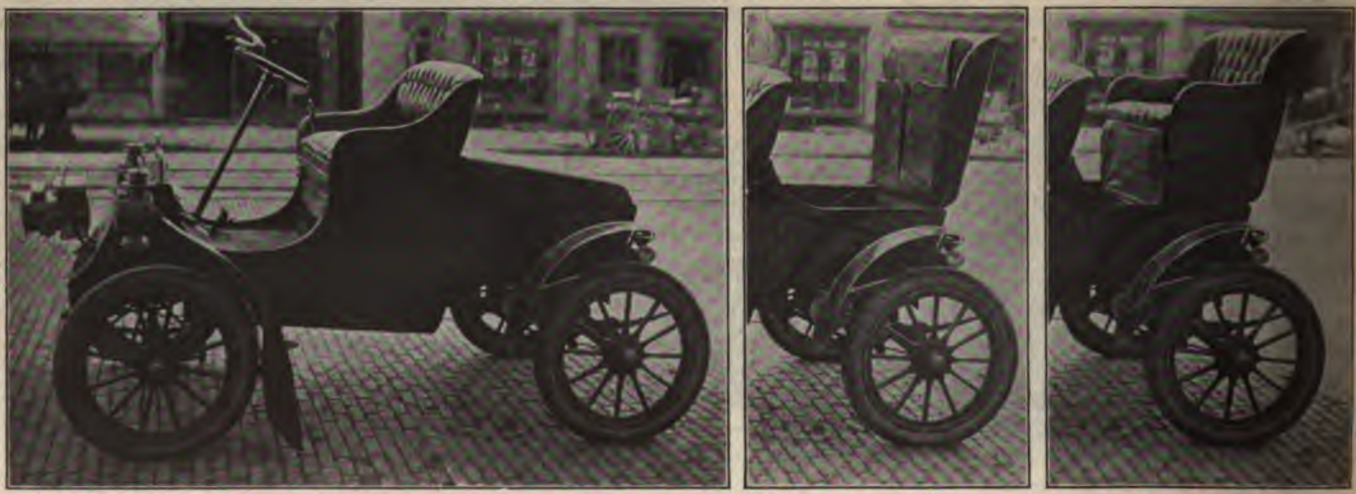
Official Report on the British Trials of Small Cars.

Out of the 38 entries 35 competitors started, and of these 26 completed the 620 miles. Of the cars which failed to complete the runs a few were, nevertheless, of promising novelty, and some of already proved merit failed in consequence of defects not likely to be recurrent. Of the latter, there were the 7 h. p. Oldsmobile Runabout, in which the cooling system proved defective; the 8 h. p. Cadillac, one bearing of which heated and seized, and the 6 h. p. Vauxhall, which broke its connecting rod. The novelties were the 8 h. p. Rover, which was disabled by the breakage of one ball in a crank shaft bearing, and the 7 h. p. Downshire, in which one of the gear wheels was broken by displacement of a pin. Defective pipe connections were mainly accountable for the other retirements.

A large number of cars appeared to be made up of almost identical parts, individually well designed, but roughly and sometimes flimsily assembled. This was particularly noticeable with regard to parts of tubular frames, back axles, gear-box and engine connections. Several of the tubular frames are made with weak lugs carrying the underframe, and five of these lugs broke during the trials.

The majority of live back axles differ little in design, except that some have trussing stays to the bevel gear-box, while others leave the somewhat heavy weight in the middle of the axle insufficiently supported. The bevel gear-box of some axles is conveniently arranged to permit withdrawal of the bevel pinion without dismantling the axle. The Wolseley, Siddeley and Prosper-Lambert cars carry the back wheels on extensions of the tubular part of the axle, thus relieving the differential axle of all weight and all stress other than that of torsion, a construction to be commended.

In more than one instance it was found that the axles were neither parallel nor at right angles to the frame, nor did the front



The Artz Rear Seat.

wheels track with the hind wheels. Although no appreciable difference in the wear of the tires was noticed at the end of the 620 miles of running, the result of improper alignment of axles cannot but have a detrimental effect on the life of some or all of the tires.

In the construction and arrangement of brakes great improvement is shown. The side brakes on a few cars are effectively compensated, but in others, where wire rope with sharp bends is used, the intended compensation is not effective. In several cases the absence of a flange on the inside of the brake drum permits the band to wander from its place.

The foot brakes are generally effective, but several, when applied, tend to displace and strain the gear-box shaft, causing unnecessary wear of the bearings. Adjustments of some kind, though not always accessible, are provided on all cars. The foot brake on the De Dion cars is notably easy to adjust, and two or three cars have right and left-handed shackles for ready adjustment. A remarkable improvement is shown in the carriage springs and body suspension, and the seating and footboard accommodation is less cramped than hitherto.

Many cars have steering gear of the rack-and-pinion type, with the rack not protected in any way from the ingress of dust and mud. All these show signs of considerable wear, and some were nearly worn out. The steering gear is in several cases poorly attached to the frame by a single bracket flange. With a steering rack some distance below, not stayed in any effective way to take the thrust, a twisting strain is thrown on the bracket, and causes looseness. Pins in the links of the steering gear frequently have small wearing surfaces, which give rise to backlash and rattling, but on the whole there is a general improvement in the design and construction of steering gears.

The number of tire troubles was exceedingly small, as might be expected considering the light weight of the cars, but it must be noted that the road surfaces were exceptionally good.

Twenty-two of the engines which completed the trials were vertical and four horizontal. Many of the vertical engines have their commutators placed in inaccessible positions close to the front or side of the frame. In the two-cylinder Humber, No. 34, bevel gears are used to bring the commutator into an easily accessible position; in others, the entire commutator is designed for easy detachment. It was noted that the horizontal engine designs lend themselves to convenient arrangements in this respect.

One of the most frequent causes of stoppage was defective junctions in pipework. Rubber connections on water pipes are often too short, and the edges of the pipe ends, aided by vibration, cut through the rubber. Gasoline and oil pipes frequently broke off at the terminal collars or unions, owing to neglect to anneal after brazing and to the vibration of long unsupported lengths of pipe. Slack-fitting, coarse-threaded unions, which came unscrewed, were numerous. Water pipes attached to tanks without a flange, riveted as well as soldered, in several cases came adrift. The use of brass flanges on exhaust pipe connections caused trouble and is to be deprecated. The gasoline tanks on some cars are inadequate for ordinary requirements, and a few are placed too low to feed the carburetor on steep hills.

Except for broken pipes, no troubles arose through insufficient lubrication. A few cars are fitted with ring lubricated bearings, a feature which might with advantage be more generally adopted.

The number of stoppages on the road caused by defects in inlet valves shows the need of attention to proper design of the cottars and the fittings at the end of the stem.

There was marked superiority in the cleanliness of those cars provided with good aprons or undercasings. One badly fitting apron, however, caused trouble, and several aprons, leaving large open spaces, were ineffective.

Bowden wires are used in a few cases for throttle and spark connections, and proved unsuitable.

The construction of clutches as to adjustment and end thrust shows considerable improvement, especially in some cars of British design and make.

The electric wiring on most of the cars has received more attention than was usual a year ago, but still leaves much to be desired. The two-cylinder Humber and the De Dions in particular, and also the Swifts, the Mobiles, the Wolseleys and the Siddeley, have taken special pains to avoid loose wires, with their consequent liability to breakage, more particularly in the case of the heavy high-tension leads. Terminals on British designed cars were notably better considered than those on the usual foreign type.

The consumption of gasoline varied considerably, the best performance being remarkable and the average highly creditable.

The water consumption on the majority of the cars was negligible—no less than fourteen of them requiring less than 1½ gallons—although the country traversed was exceptionally hilly.

Motor Wagon for the Russian Army.

The following data of competing cars and of their performance is obtained from tables published with this report.

The car-miles per gallon varied from 47.2 to 15.6, but this figure doesn't really mean much, as the car which consumed the least gasoline was designed to carry only two passengers and weighed only about half as much as the one which consumed the greatest amount of fuel, which is a four-passenger car and carried three in the trials. Of greater interest is the consumption per ton-mile, which varied between .033 gallons and .077 gallons, and averaged .051 gallons. It should be pointed out in this connection that the roads over which the trials were held were for the most part in excellent condition.

Another interesting feature is that all the cars entered, with the exception of the Americans, have narrow treads. Excepting the Oldsmobile and Cadillac, the tread varied from 41¾ inches to 50 inches, the average being only 45 inches. The inside width of the front seat varied from 36 inches to 43 inches, the average being 38.6 inches. The width of the foot board varied from 28 inches to 36 inches, the average being 31.7 inches. The distance from the front of the seat to the dashboard varied from 22 inches to 41 inches, the average being 25.3 inches. The wheel base varied from 62½ inches to 88¼ inches.

Causes and Prevention of Side-Slip.

The following memorandum on the causes of side-slip has been prepared by a committee of the Roads Improvement Association:

The great and increasing danger to cyclists, and also to a less extent to drivers of motor cars, from what is known as "side-slip" has for some time past engaged the attention of the Roads Improvement Association, with a view to discovering means for its prevention, or, failing that, to the adoption of such measures as may minimize it.

"Side-slip" may be defined as the sliding sideways of the wheel or wheels of a carriage independently, and in defiance, of the direction sought to be given them by the person steering, the sliding being caused by a greasy or slippery state of the road surface.

"Side-slip" causes the driver of a vehicle to lose control of its direction, so that its motion can only often be arrested by violent contact with another vehicle, or with a fixed object.

"Side-slip" usually occurs where it is most dangerous to pedestrians and vehicle users, namely, in crowded streets, where a pedestrian or cyclist falling from this cause is likely to be run over; and a large number of serious accidents—many of them fatal—have occurred within the last twelve months. It is, in fact, daily becoming more obvious that side-slip has increased, and is increasing. And though, no doubt, accidents will always occur, yet accidents from this cause are mostly preventable without much difficulty.

The chief (preventable) causes of side-slip may be enumerated as follows: (1) Watering roads in an unsuitable manner; (2) failure to clear away mud; (3) use of greasy road material; (4) excessive banking up or "cambering" of roads, especially near the sides; (5) all kinds of longitudinal or oblique sloping projections or depressions in the surface of the road; (6) all kinds of unduly sloping surfaces; (7) sudden changes from one road material to another; (8) failure to sprinkle slippery surfaces with suitable gritty material when necessary; (9) watering of street rails. A combination of any or all of the above causes tends to aggravate the evil.

MUDDY ROADS.

Liquid mud is not by any means so dangerous, or likely to cause side-slip, as thick mud; for side-slip occurs chiefly when the tyre of the wheel rolls over the mud without penetrating quickly through it to the firm ground below. Consequently, if more than a mere sprinkling of water sufficient to lay the dust is applied, it should be applied sufficiently to liquefy the mud, unless, perhaps, in cases where care is taken to clear the mud away immediately after the water is applied.

It is when mud has been tempered by the traffic into a smooth paste that it is most liable to produce side-slip. Mud should always be removed from the streets before it reaches this condition. If the mud has once hardened it should be removed from the streets either by scraping or brushing after copious watering, or, as an alternative, it should be removed in its dry condition before the water is applied. On country roads made with limestone, oolites, and other grease-producing materials, the roads are generally dangerous when rain first falls after a long dry period, as there is then a considerable accumulation of mud-forming material on the road.

The sprinkling of the roads in dry and dusty weather requires special care. The frequency of the sprinkling should be governed by the condition of the road. When the surface is new and of good shape, with few or no depressions in it, the road requires less sprinkling, and at infrequent intervals; but when it is partially worn, if heavily sluiced, the water collects in the depressions, and provides mud-making centers. Such partially worn roads should be sprinkled sparingly at frequent intervals.

The method—frequently adopted in towns—of confining the sprinkling to the sides of the road, leaving the center dry, is exceedingly dangerous. The whole of the traffic attempts to keep on the dry portion of the road; but when overtaking or passing, the vehicles must pass suddenly from the dry non-slipping surface to a greasy one. This frequently results in side-slips and accidents of more or less gravity to men and horses as well as cars.

GREASY ROAD MATERIAL.

A great deal can be done by the use of suitable road material. In the country the flint roads of the South of England and the Whinstone roads of the North are good. The oolites and Bristol blue are always liable to produce greasy mud. Macadam roads made with granite in towns where the traffic is heavy are often dangerous on account of the mud that is formed collecting in the depressions. A newly-formed granite macadam having a good surface is only dangerous when the road itself is unduly sloped at the sides.

Asphalt, though it has many great advantages, is especially liable to be dangerous under the last-mentioned circumstance unless kept very clean.

Flint and gravel are the least dangerous in this respect, and granite occupies a middle position. Stone setts are liable to become very dangerous, and a crossing of stone setts, if set across the roads diagonally, is a frequent cause of accidents.

EXCESSIVE CAMBER.

A great majority of cases of side slip occur when the vehicle is on a road which slopes laterally, and the steeper the slope the greater the danger. They have also the serious disadvantage of tempting users of vehicles of all kinds to keep at the top of, and in the middle of the road, instead of at their proper side. This causes dangerous accidents, as the vehicles overtaking are compelled to turn out of their proper course to avoid those which are in the middle of the road, and it is when a cycle or motor is in the act of turning that it is likely to "side-slip."

CONDITION OF ROAD SURFACE.

All longitudinal or oblique substances in a road of different material to the rest of the road have a tendency to be dangerous to vehicles, unless continually kept level with the rest of the road with the most exact and scrupulous care. For this reason the ends of the pitching which guard the entrances to the sewers or other openings should always be finished square to the direction of the traffic. Many side-slips are caused by the car striking on one side of the round patches of pitching so often used on country roads. The material being different, the wear is different, and the longitudinal substance being usually harder than the rest of the road surface, sometimes projects above it. Street car lines are the worst offenders in this way, especially when prejecting one, two or more inches above the road surface. Numerous accidents and many deaths have resulted from this cause, and if the street car line itself does not so project, the wood, granite, or other material in which it is set frequently does project. Oblique granite

ngs are also very dangerous, when fter road surface adjoining the gran- ecks is allowed, as it usually is, to elow the crossing.

MATERIAL AND SURFACE TREATMENT.

uent changes in short distances of aterial of a roadway are to be depre- Asphalt will often be quite dry and when granite is at its most slippery on. While deprecating unnecessary and expenditure on sharp, flinty which tends to destroy rubber tires, ell to point out that such grit might be used with advantage where it has o been but little used—viz., where s much thick, pasty mud about. It necessary or desirable when the road tively wet, though that is when it is mployed. Blue granite chips, as em- on the asphalt in Holborn, appear quite effective, and to be free from jection of cutting rubber tires. All d clippings so used, however, help troy some road surfaces, especially and wood under the action of iron Frequent road surface cleaning is o be preferred.

WATERED STREET CAR LINES.

watering of the grooves of street car order to save the small fraction of y in the cost of the power to drive a practice which is much to be ted, as it renders slippery and dou- ngerous things which are already to cause accidents. Generally, it said that most of the causes of would be removed by that judi- oad surface maintenance which in is most economical, by enforcing powers as to the surface main- along street railway lines, and by scavenging and road cleaning.

Motor Wagons in the Soudan.

99 an attempt was made to estab- regular automobile service between egal and Niger Rivers in the French The 50 vehicles which were to Africa for the purpose are now ed in the brush, and serve as lodg- darkies who have installed their therein and carried away everything s of use to them. The original f the service was to be gradually d as the building of the railroad ed. A contract entered into on th, 1899, stipulated that the State Colony engaged to provide other or the vehicles of the company to upon as they became free by reason ess in the construction of the rail- The contract also stipulated that in company should fail to put into eration before Nov. 15, 1899, a ser- at least 42 vehicles, it would be to a penalty of 10 francs per day vehicle missing. On the other on May 1st, 1900, the service was not in at least partial operation, the Lieutenant Governor of the Soudan could, after ineffectual official notification, declare the contract annulled, and the bond of 25,000 francs forfeited to the State.

As concerns the routes, the contract contained a paragraph stipulating that after the completion of the improvements actually in progress, the company was to use the roads in the State in which they were found Nov. 15, 1899. From that date on the maintenance of the roads was to devolve upon the company in charge of the project, in consideration of a sum of 150 francs per year and per kilometer covered by the automobile service.

But the rather audacious expectations of the promoters were never realized, and the population of the Soudan is not disturbed by the noise of the auto horn. The service was not organized, but a judicial note was sent to the company on Jan. 17, 1901, in which the Minister of the Colonies declared the contract void and the bond forfeited to the State.

The company protested. It claimed to have shipped to Africa more than 50 motor vehicles, and to have recruited a force of European machinists. It would therefore have been in position to carry out its part of the contract if the state of the roads had permitted. But the administration had not fulfilled its foremost obligation, which consisted in furnishing passable roads. On Jan. 15th, 1900, only 80 kilometers of the 250 were in fair state of passability, and these roads were situated, so the company alleges, not at the terminal point of the railroad, but at the opposite end of the route, near the Niger.

The administration of the colonies forcibly denies the allegations of the company, however. It maintains that the latter was far from being able to open the specified service on the stipulated date, viz., Nov. 15 1899, since the vehicles were only shipped from Kayes toward the end of December. On Jan. 15, 1900, the administration adds, the manager of the company wrote to the Governor-General a letter in which, after having acknowledged that the new route constituted an important work and was worthy of all praise, he requested to be relieved of the penalties provided. The minister acceded to this demand, based upon the alleged intervention of causes beyond human control, and consented to a postponement of the date of opening.

The service, however, was never put into operation. The company was involved in various troubles and difficulties in which the administration had no part, these being, according to the Minister of the Colonies, the real reasons which prevented materialization of the undertaking. The Chinese laborers imported by the company went on strike; the engineers and machinists quit their places, owing to poor accommodations and insufficient remuneration, and the company was bothered by local creditors. Finally the situation came to a climax. In the hope that the new motor service would suffice for all transportation, the annual purchase of mules had been limited, and the shipment of supplies to the posts in the uper Senegal was therefore threatened. These are the reasons which are claimed to have justified the annulment of the contract on Jan. 17, 1901, and the confiscation of the bond.

Immediately upon the ministerial decision, the company lodged a complaint with the State Council, asking for the withdrawal of this decision, the restitution of its bond, and 50,000 francs damages. Shortly after, however, it began a suit in the Court of Complaints of the Senegal administration, which on June 19, 1902, declared itself competent in the matter. This suit is still pending.—*La France Automobile.*

Speed Change Gears—Single vs. Double Sliding Sets.

With few exceptions, all speed changing gears are of the sliding pinion type. The teeth of the gears are always beveled off, to facilitate their sliding into mesh, but they may be beveled either on one end only or on both ends, according to whether the wheel needs to be slid into mesh from one side only or from both sides.

What distinguishes the different systems is the arrangement of the sliding pinions, some manufacturers preferring to mount all of them on a single shaft, while others believe in the use of two sliding sets. We will, therefore, briefly discuss the advantages and disadvantages of the two systems.

The simplest and the earliest in date of the two is the system employing the single sliding set. Four gear pinions securely fastened to the same sleeve sliding on a square, hexagonal or keyed shaft, may be brought into mesh with four gear wheels fastened to another shaft. The distance apart of the different gears varies, and is carefully determined in each case, in order tha the different pairs may be brought into mesh in regular succession. This arrangement presents evidently the greatest simplicity, because a single operating lever, connected to the sliding sleeve, suffices to bring the latter into the different positions required. The operation of the device is also very simple. On the other hand, it will be seen that for passing from one speed to another it is necessary to have between the two positions, a space equal to the width of the gear, plus a certain clearance or play, to make absolutely sure that two sets of gears cannot be enaged at the same time. For a four-speed change gear it is therefore necessary to have a length equal to seven times the face width of the pinions, plus three times the clearance. The result is a long and bulky gear box. Owing to the great length, the square sleeve is more delicate to adjust, is more liable to grip, since the shaft may get out

of line easier, vibrates more and causes more noise to be produced by the gear; the shaft will "give" or spring more readily, and in consequence reduce the efficiency of transmission, since the gears are not then in absolutely perfect mesh.

The great bulkiness is also an objectionable feature. The range of motion of the operating lever at the right hand side of the driver is quite limited, and cannot be greatly increased beyond the normal without making its operation difficult. Consequently, if the sleeve has a wide range of motion, the operation of the lever requires greater effort. Besides, any errors in the position of the operating lever are of greater importance, as well as any play in the notches of the quadrant. One is therefore obliged to allow a comparatively large clearance between the different positions, to prevent the operator from accidentally engaging a gear which he does not want, and the gear going into mesh automatically, owing to play of the latch pin in the stop notches. The designer is therefore confronted with the following dilemma: Either the sliding sleeve may be given a large range of motion and the gears made wide, resulting in difficult and inaccurate operation; or the gears may be made narrow, and the motion of the sleeve reduced.

However, the teeth of narrow gears have little structural strength, and the second solution is therefore a rather poor one. The width of the teeth is still further reduced by the fact that for the intermediate-speed gears the teeth must be beveled on both ends, and only the section between the two beveled parts remains to support the pressure on the teeth. Sometimes still another objection is raised to change speed gears with a single sliding set, and that is that it is necessary to pass through intermediate speeds when, for example, the vehicle is stopped on the fourth speed and is to be restarted on the first speed. For these various reasons, and in spite of the simplicity of construction and operation of gears with a single sliding set, many manufacturers have adopted gears with a double sliding set.

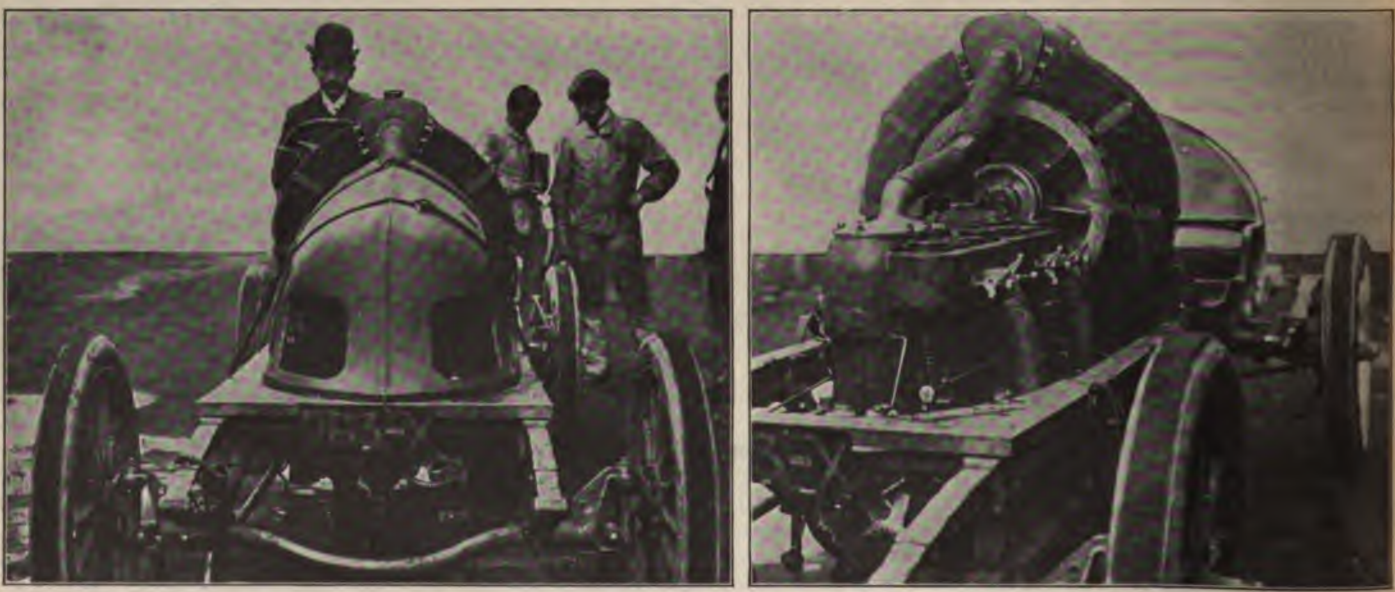
With a gear of this description, all the space required between the first and second speed gears, is the width of the pinion plus clearance, and the same between the third and fourth speed gears, making the total length of the gear equal to six times the width of the pinion, plus twice the clearance. There is, therefore, quite a saving in width from this fact, but this is not all. The operating lever is moved through its entire range of motion in shifting the sliding set from the first speed position to the second speed position, the middle position of the lever being neutral, so that in drawing the lever back one obtains the first, and pushing it forward the second speed. Consequently, the range of motion of the sliding set corresponding to the full range of motion of the operating lever, is now only equal to three times the width of the pinion, instead of seven times, and there is only one chance for play, instead of there being three. Advantages are therefore gained in respect to the effort required to operate the gear, and in respect to the possible width of pinions, allowing to increase their strength, and as the gears mesh only from one side, the teeth need be beveled at one end only, thus still further increasing their effective width. Finally, the length of the sliding sleeve being smaller, the sleeve can be better adjusted, slides better and is of greater rigidity and structural strength. The precision of position is more than doubled, since the reduction of motion from the operating lever to the sliding set is less than half what it is with a single sliding set, and the driver need not hesitate in changing his gear, as he has simply to push the lever to the limit of its motion.

To engage the third and fourth speed gears the lever is first brought into the central position, then by a vertical or lateral movement, according to the particular make, it is moved into a second sector similar to the first, the extreme outward positions of which corresponds to the third and fourth speed. This vertical or lateral motion of the lever brings it into operative relation with the second sliding set. It will be seen that with this system it is possible to pass directly from any gear to any other gear. It may be added that by means of another vertical motion of the lever the reverse motion may be obtained, so that a single lever serves to obtain all four forward speeds and the reverse, which compensates in part for the complication of the double sliding set.

It remains for the designers to choose between the two systems, but it would seem that for heavy vehicles at least, the double sliding set system will carry off the victory.—M. Caron, in *Cycle et Automobile Industriels.*

Renault 90 H. P. Racer.

Owing to the fact that Marcel Renault met with an accident in the Paris-Bordeaux race last year which resulted in his death, the Renault Bros. firm refrained from participating in races for a period of about a year. They will be represented again for the first time in the Vanderbilt Cup race on Long Island next Saturday by a 90-h. p. machine of special construction, two views of which are shown herewith. The most notable feature of the new machine is the odd arrangement of the radiator, in the form of a horseshoe at the back of the motor, surounding the fly-wheel. A 90-h. p. motor naturally requires a radiator of enormous capacity, both when the car is traveling at high speed and when running slowly through controls. It will be noticed that the fly-wheel is cast with radial vanes forming a fan which produces radial air currents through the radiator. These air



Renault 90-H. P. Vanderbilt Racer.

currents are independent of the speed of the car and the fan does not interfere with the blast through the radiator created by the motion of the car. An ordinary helical or screw propeller fan will actually retard the circulation of air when the car is traveling beyond a certain speed. There is undoubtedly also an advantage in the location of the radiator, as with no motor, dashboard, etc., behind it, there is nothing to obstruct the rush of air through it.

Major-General Sir F. R. Wingate, the Sirdar, has recently been conducting some experiments with an automobile on Dunbar Sands, Scotland, with a view, should the trials prove satisfactory, to sending out a number of the cars to the Soudan. The Sirdar stated that the car had come out of a succession of exceedingly severe tests in a satisfactory manner. The narrowness of the solid rubber tires was mainly accountable for the tendency to sink in the sands, and probably with broader tires many of the difficulties met with might be overcome.

There are now seventy-two motor cabs in use in Berlin, Germany, and although their novelty has worn off to a considerable extent, their use by the public is increasing. An ordinance passed in 1898, to limit the number of cabs plying in the city and issue no more numbers, has recently been revoked, in view of the desirability of encouraging motor cabs.

Fifteen electric mail wagons are to be placed in service in Paris on October 15. Their total weight loaded is 5,280 pounds, divided as follows: Accumulators, 1,320 lbs; frame, motor and body, 2,222 lbs; men, 308 lbs; useful load, 1,430 ilbs. The motor is located at the center of the châssis, and the transmission is by side chains. Twelve of the vehicles will be constantly kept in operation and three in reserve. The Paris post office has been using 600 horses and will dispense with forty when the motor wagons are placed in use.

The German Automobile Club has nominated two Mercedes cars to represent it in the Gordon Bennett race next year, and the third car of the team will be selected by means of an eliminating trial in which the Daimler (Mercedes) Co. will also take part.

A cash prize of $500 for the winner in international endurance competition for Herkomer Cup, to be held next summer by the Bavarian A. C., has been donated by Dr. Magin, of Paris.

The Glasgow (Scotland) Sanitation Department contemplates the general use of motor wagons for all public work.

Austrian Teamster's Habits.

Dr. Karl Brecht, an automobilist of Vienna, Austria, spent the summer in the mountainous province of Corinthia, and during five months kept note of all offenses against road rules committed by teamsters that came under his observation. The list at the end of this period was as follows: In 541 cases the drivers did not have the lines within their reach. In 224 cases only one of the lines was attached to the bit. In 186 cases the drivers were not with their horses, but in advance or behind, or the drivers of several wagons following one another were seated together on one wagon. In 294 cases the bits were not in the mouths of the horses, but hanging free down the side. The drivers were drunk in 128 cases, while 211 were sleeping. In 87 cases the horses were driven by boys not over 14 to 15 years old. One hundred and twenty-four teams stood on the road unguarded and unattached. Sixteen times the automobilist was prevented from overtaking a team, and once a teamster failed to draw out of the way. In 89 cases wagons were driven down hill without being braked, and in 103 other cases hills were descended at full speed. Abusive language toward the automobilist was used by 12 drivers, and 82 wagons were driven without light at night.

Chicago Races.

On September 30 and October 1 races were held on Harlem track, Chicago, under the auspices of the Chicago Automobile Club. On both days a large number of spectators watched the events, and it is estimated that 200 or 300 cars were driven to the track on each occasion.

The star performer of the first day proved to be Frank Kulick, who drove the 20-h. p. Ford "Baby Limited," and won both feature events—the five mile race for cars wighing between 881 and 1,432 pounds, and the five mile race for cars of any weight or motive power. In the first of these he had as a competitor Carl Fischer and the Premier "Comet." Kulick passed the starting line a length in the lead, but the word to "go" was given. These positions were held until the third lap, when Fischer's car began to miss, and he accordingly fell behind until Kulck obtained a lead of about an eighth of a mile, which he held to the end.

The four fastest cars present came together in the five mile free-for-all. Kulick (Ford), Fischer (Premier), Lyttle (Pope-Toledo) and Apperson (Apperson) crossed the starting line in the order named. There was very little change in positons during the five miles, the leading cars remaining the same throughout. At the finish Kulick had increased hs lead over Fischer to about seventy-five yards.

Much interest was manifested in the match race between Miss Neva E. Scott and Mrs. L. P. Roenitz. The former drove a 24-h. p. Locomobile, and the latter a Pierce Arrow of like power. Mrs. Roenitz was leading when, in the second mile, her car went wrong and she was forced to retire, conceding the race to Miss Scott.

There were thirteen starters in the ten-mile handicap, which was won by F. O. Tulman, driving a 14-h. p. Renault, with a start of six and one-half minutes ahead of Kulick, who started from scratch. Apperson, with two and one-half minutes' handicap, was second.

The pursuit race came to an end at three and one-eighth miles, when Fischer, with the Premier "Comet," passed the Apperson, driven by Edgar Apperson, the only other starter.

The attendance on the first day was about 3,000.

SECOND DAY.

Kulick and Fischer came together in two of the events on the second day, honors being divided. In the first of these, which was the Diamond Cup race, Kulick held the lead over the field until the end of the first half mile, when Fischer, who had been working up from last position, passed him, finishing the mile in 1:00 flat. The next mile was negotiated in 1:02, which established a new record for two miles for cars weighing from 881 to 1,432 pounds. Fischer's lead was never in danger during the remainder of the race, and he finished several lengths ahead of Kulick, in 5:15 3-5.

Kulick balanced matters in the five mile special race, in which he was matched against Fischer. The race was decided by the best two in three heats. It proved by far the most exciting of the meet. In the first heat Fischer held the lead until the three and three-quarter mile mark had been passed, when Kulick's machine came up with a burst of speed that carried him ahead and finally gave him the heat. The second heat was a see-saw match for the entire distance, first one and then the other leading. Fischer managed to cross the line first, less than half a length in the lead. The third and final heat went to Kulick, who thereby won the race.

A summary of the second day's racing follows:

Five Miles for the Diamond Cup.—Carl Fischer (Premier), first; Frank Kulick (Ford), second. Time 5:15 3-5.

Five Mile Special Race.—Frank Kulick (Ford), first; Carl Fischer (Premier), second. Time, 5:10 2-5.

Five miles for Club Members. — Ed Apperson (Apperson), first; E. F. Webb (Pope-Toledo), second. Time, 6:23.

Five Miles, Cars Weighing from 1,432 to 2,204. — H. Lyttle (Pope-Toledo), first; W. Kniper, second. Time, 6:22.

Race for Temple Cup.—E. F. Kirchberger, first; C. H. Harbest, second.

Ten Mile Handicap.—Chas. Webber (Pope-Toledo), first; O. F. Webber (Pope-Toledo), second. Time, 15:44.

COMMUNICATIONS

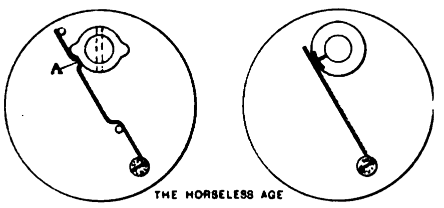
Ignition Query.

Editor HORSELESS AGE:

I have an auto of the light detachable tonneau type fitted with a $4\frac{1}{4}$ x $4\frac{1}{4}$ inch opposed engine rated at 10 h.p. I think that it is overrated. What power should it develop at 800 rev. and at 1,000 rev? Both spark plugs are connected to a single coil. Some owners of these cars have had the ignition system changed to the two-coil system. They claim this is a saving of batteries, because there is no spark in the cylinder at the end of the exhaust stroke when it is not needed. Is this so or not? In other words, does a longer space for the spark to jump across use more primary current than a short space? The contact is arranged as shown in the sketch, and the constant friction at A causes the plug to wear through and break. As it is a dirty job to repair, and a constant annoyance, can you suggest a way of remedying this trouble?

E. PAUL DU PONT.

[Ten horse power seems to be a rather



high rating for an engine of the size mentioned, and could hardly be obtained at 800 rev. per minute. While there might be a slight saving in the electric current if double spark coils were substituted for a single coil, and a spark produced only when wanted, it would not be nearly as great as might be expected from the fact that twice the number of sparks actually needed are produced with a single coil. To force a spark across two gaps in series requires a greater potential than to force it across one gap only, and hence, the coil must be more powerful and take a greater current, other things being equal, than if the spark had to jump a single gap only. But the resistance in the cylinder in which there is no compression is many times smaller than the resistance in the cylinder in which the explosion occurs, perhaps ten times, hence there is comparative little difference between the pressure required to force a spark across the gap in the compression cylinder only and forcing it across this gap and that in the other cylinder in which there is no compression. Altogether, we believe that the single coil is the most advantageous, as you have to adjust only one vibrator and use only one coil.

We presume from the sketch you send that the contact maker serves also as a vibrator, and that there is no magnetic vibrator on the coil. Mechanical vibrators like this are generally unsatisfactory, and if our supposition is correct, we would advise that you substitute a vibrator coil for your plain coil and for the contact maker which you now use, one consisting of a circular disk of hard rubber with a copper sector embedded in its circumference and metallically connected to the shaft, a brush consisting of a spring blade bearing on the circumference of the disk.—ED.]

Horse Power Calculation

Editor HORSELESS AGE:

What is the best method of calculating the power of a four-cylinder four-cycle motor of $4\frac{7}{8}''$ bore and $5\frac{1}{4}''$ stroke, and running at 857 revolutions (750 feet piston speed). By the method of squaring the bore and dividing by three, I get

$$\frac{(4.875)^2}{3} = 7.92 \text{ per cylinder, or } 31.68.$$

By the longer calculation

$$\frac{(4.875)^2(5.25)(857)(4)}{19{,}200} = 22.26$$

What do you consider that a motor of these dimensions should be rated at?

S.

[Squaring the diameter and dividing the product by four is a good formula. This would give about 24 h. p. for an engine of dimensions as above.—ED.]

Rapid Repair After a Serious Accident.

Editor HORSELESS AGE:

While testing one of our own make of four-cylinder touring cars a few days ago, we had an experience which may prove of interest to the readers of HORSELESS AGE.

The car was a new one and had not been run over thirty miles at the time mentioned. The steering gear was stiff, and the throttle did not control the engine as it should have. We were going along on the direct drive, perhaps fifteen miles per hour, down a very slight slope and over a road that is second to none in the county. At the bottom of the slope is a small bridge, and as we approached it, we noticed a team standing in the center of the road near the end of the bridge. The driver of our car slowed up, and after crosing the bridge turned out to pass the team. However, about two feet on the edge of the road had been newly "made," as it is called in this part of the country, and was nothing more than loose sand. As soon as our front wheels struck this, the car became unmanageable, and tearing through three panels of guard rail, jumped over an eight foot embankment to the bed of a small stream, and there turned on its back, resting on the steering column and seat. The writer at the time of the accident was riding on the step, and as the car left the road, was thrown off. A mechanic we had with us was thrown also, but the driver stuck to the car until it turned over, and narrowly escaped being caught under it. After righting the car, we found the body, which was simply a seat made of pine, badly split, the steering wheel broken and the column badly bent, the battery box torn from the step, and the cross rod between the two steering knuckles, sprung so as to draw the wheels toward each other. The machinery was uninjured and we decided to run home with our own power. The first thing was to get the steering column straightened, and this we did by disconnecting it and battering it against a tree until it worked freely. We wired the wheel up so as to get home with it, and mended in a temporary way the other damage. We ran the car out of the ravine with its own power, and were on the road home in less than three hours from the time the accident happened. Six hours' work and a new steering wheel removed all trace of injury from the car, and we were out for another trial trip the next afternoon.

We were surprised at the wonderful flexibility of the pressed steel frame of our car, and very much pleased with the way it withstood the jolt and jar of an eight-foot leap. Our motor and transmission were not in any way injured and did not refuse to take us home as fast as we cared to go with our crippled wheel and steering column.

A. C. PENDLETON.

Contact Ignition Not Affected by Compression.

Editor HORSELESS AGE:

On page 276 you state, what is quite true of the jump spark system, viz., that a high compression requires a strong battery for certain ignition. This is not true, however, with make and break ignition, for here the arc follows the separation of the points, regardless of the density of the compressed charge, and the more dense it is the more readily it ignites. The reason of failure with the jump spark is because of the increased electrical resistance, which, with the make and break, may render the spark shorter but cannot stop it.

CHAS. E. DURYEA.

Automobiling in Montana.

Editor HORSELESS AGE:

I am enclosing a letter received from one of my men who is operating a car for F. Aug. Heinze, at Butte, Mont. Some of the letter, I have no doubt, would make interesting reading for some of your subscribers. The car he is using is a 35-h. p., with 34 x 4" tires on the front wheels and 34 x $4\frac{1}{2}$" tires on the rear wheels.

FRANK P. ILLSLEY.

[*Enclosure.*]

I am just back from Deer Lodge, where

I took a party this afternoon. Made the run back, forty-eight miles, with eight in the car and over a very rough road, in two and a half hours. The three gas lamps give enough light to enable us to make as good time at night as by day. Going over, we had trouble finding a road suitable to the car. The one we started on soon became impassable, on account of the deep ruts, rocks and stumps. Had to run about half a mile where the fly-wheel dragged on the ground most of the time. The road was through the woods, and so narrow there was no chance to turn out. Sometimes I would have to run the wheels over rocks a foot and a half high. Finally, we came to a large stump in the center of the road, and, as we could not go on, had to back up about a quarter of a mile before I could turn around. Then we went back about three miles and struck another road which though very fine in stretches was rough and stony and full of very bad chuck holes most of the way.

The last time I wrote, all the roads I had seen were what they call boulevards out here. Have since been over a number that the automobile people here told me were impassable to a car like this one. We have had to abandon the long trip, as it could never be made with this car. Even if the axle and fly-wheel were a foot higher, it would be hard work.

Have been making a lot of runs through the country around Butte, and aside from crank-shaft trouble the car has behaved beautifully. Have not had a second's trouble with the engine on the road, except occasionally blowing an igniter gasket, and do not believe it has missed a shot. It took just five days to get the machine ready after the shaft came, which was not bad time, considering the extra adjusting and fitting due to the frame being sprung and throwing things out of line. Got rid of that knock in the engine entirely, and the car, with all the hard usage it has had, runs quieter now than it ever did in Chicago. I set the exhaust valves to close a little later than they did, and get more power, though a little less speed. Can get up Main street and some other hills on the second speed at twenty miles an hour, while the first time I ran the car here, though it worked perfectly, I could not get quarter way up on the second.

Was laid up again lately with another sprung crank shaft. Had a very queer experience and don't know as I should tell you about it, as you may have some difficulty in believing my statement. Told Mr. Heinze, and he just said "Come off," and walked away. This is the way it happened:

We took a run over to Dillon, seventy-five miles from Butte, when within twelve miles of the town the fly-wheel caught the top of a rock which was hidden in the grass and sprung the shaft so the wheel ran out more than half an inch. I did not see any rock and thought the front wheel must have thrown up one against the fly-wheel. Anyway, we ran into Dillon, and when I left Mr. Heinze he advised me to ship the car back by freight. He did not say a word about the accident, except to ask how long it would take to get the machine in shape. He also remarked that he had a very fine ride. It took five hours to make the trip, but we were delayed a number of times.

One place the road was washed away and we had to run around over a pile of rocks. At another washout we could not get around, and had to hunt up some planks and run on them over a break in the road six feet wide and ten deep. At another place we ran through water up to the carburetor. I stayed at the hotel that night and next morning, as I was not able to get a car the machine would go in, thought I would experiment with it. Ran it over to a blacksmith shop and took the dash off, and while I held a crowbar between the top rim of the fly-wheel and the transmission case, the blacksmith ran a six-foot bar of 2½" steel over the front axle and up against the lower rim of the fly-wheel. It took about six hard blows to make much of an impression on the wheel, but we worked at it awhile and got the wheel so that it did not run out but 3-32 of an inch. Thought that would do to run to Butte, and started back with two men from Dillon for company. When we came near the place where the rock was located, I kept a very close watch for it and while doing so ran sqpare on to it. The fly-wheel hit it a much harder blow than at first, and I though surely we were laid up. Got out to see how badly we were damaged, and when I started the engine, was surprised to find the wheel running absolutely true, not out a hundredth of an inch. Everything was all right and we moved on, the machine seeming to run better than ever.

When we arrived at Butte, I called Mr. Heinze up and asked him if he would like to use the car. He seemed to be somewhat surprised, but said he would. We ran until twelve that night and everything worked fine. When I got a chance I told Mr. Heinze about the rock story and he did not seem to want to believe it. He left the city that night for a few days, and I decided to take the shaft out and examine it, and replace the rear bushing, which had loosened up. The shaft is heavier than the old one, all bearings being 1¾". We got the shaft in the lathe with a test gauge on it, and found it to be true within 1-1000th of an inch. All we had to do was to straighten out the clutch pilot a little, put in a new bushing, bore out the rear end of the crank case, which was sprung, and fit a new bushing around the old one, which was in good condition. The bearings were all tight and just nicely polished.

The factory sent all babbitt bushings with the new shaft, but I used the old bronze connecting rod bushings by boring them out, as they seemed to be of a very hard grade of bronze, and I was not sure how the babbitt would wear.

Am having some trouble with batteries. Cannot seem to get anywhere near the right mileage out of them. Have had the batteries charged at the electric light plant, which is the best place in town, but cannot get more than a hundred miles out of each charge. Have been using dry cells mostly, and it takes four large cells for each hundred miles. Am sure there is nothing wrong with the wiring, as I have gone all over it and replaced most of the wires. Had a box of twelve batteries fastened under the tonneau and connected that way. I may be mistaken, but it seems to me that five volts make the car run stronger than four.

What is bothering me more than anything out here is the brakes. They hold fine going ahead, both the pinion and wheel, but when I stop on a very steep hill, cannot hold the car. Have to depend on the engine pulling up, or else get someone to block the wheels. Do the manufacturers make any kind of a brake or other device that will hold a machine on a hill? I do not like the idea of a sprag, as it seems to me they are dangerous. If there is any way to make those brakes hold I would like to know about it, as I have had several very close calls, one in particular. Was climbing what is called the worst traveled hill in this part of the country one day, and when I struck the steepest part, it was all the engine could do to pull. I advised two of the party to follow up the rear wheels with blocks in case the engine stalled, which it did very soon. I would have to speed up the engine, go ahead about six feet, and stop for another start. The road at this point was just wide enough for two rigs to pass by crowding, and runs along the edge of the precipice with a sand bluff on the other side. I threw out the clutch to let the engine speed up and set the hub and pinion brakes, and the other fellows blocked the rear wheels, but all that would not hold the car. I jumped the blocks and started back and was beginning to get pretty good speed before I realized how serious the situation was. Did not think there was room to turn the car without the front wheel sliding over the edge, but had to do something rather suddenly, as the tree tops down below did not look very inviting. I turned the wheels around to the left as far as they would go, and the rear end swung around into the bank. The tonneau was forced 'way up in the air, and the front wheels dropped down in a deep hollow and stuck there and the car was balanced on the two right wheels. The whole machine was so badly twisted I could not raise the bonnet, open the tonneau door, shift gears, or get the clutch in. Five of us could not start the front wheels, and we had to hunt up some levers and pry them up. It took about an hour to work the car out where we could operate it, and then had to readjust the clutch connections and spring the gear shifter before it would work. Got down the hill after awhile and as we all had enough automobiling for that afternoon started back to Butte. The car worked as well as ever, and I was congratulating my-

self on getting off so easy, when I happened to look under the engine and discovered a crank clear across one of the front hangers.

The front axle has to be trued up after every hard run. Have a turn-buckle on the cross rod so the wheels can be lined up easily, also had ½" clips made for the front springs. The old ones would loosen up no matter how well they were fastened. Have tool steel cones on the pinion shaft and one side of the driving gear and rear wheels. Those on the other driving gear bearing were in such fine shape I did not change them.

Had to reinforce the dash with an iron plate to keep it together and run a brace to the rear valve bridge studs, which seems to be the proper place for them. The searchlight bracket played out, and had one cast ¼" thick. Also had to have the brake connection enlarged, as the studs on the levers would not stand. I kept both generators, as the amount of night work we do requires them. The large horn is just what we need, one toot will clear the road for half a mile ahead. About half the plug porcelains I have are leaking through the center, and would like some of them. Will also need some clutch leather next time the clutch comes apart. Had a ¼" collar put at each end of the spring, as it would slip sometimes when tightened to the last notch.

I find that an easy way to coil the clutch when in a hurry is to put a gun full inside and let it work out, which it does in a short time and oils every part of the leather.

E. McFarland.

Limitation of Single Cylinder Construction.

Editor Horseless Age:

It seems to me that something might still be added to your thoughtful editorial on the above subject. May there not be a third means of increasing the power of an engine besides increasing the compression and piston area, namely, dispensing with the valve chambers or pockets? I have seen the power of an engine increased by taking up some of the space in these pockets much beyond what seemed likely to result from the slightly increased compression, and I am told by two manufacturers that they have increased the power of engines by dispensing with these pockets, 15 per cent and over.

Is there no way of controlling vibration, besides keeping the impulses of the engine very light? The impact of a baseball upon the catcher's hands would certainly be prohibitive, if he held his arms and hands rigidly in position, but is unobjectionable when he adapts himself to the conditions. The sword of Cœur de Lion was destructive to the iron bar, but harmless to Saladin's silken cushion.

Can there be any fair question but that the teeth of the Packard change speed gear are less liable to break, because of the resilience of the power transmitting mechanism? The "Northern" Company claim to control the vibration to some extent by taking it up in resilient parts before it reaches the body. H. P. Maxim proposes to support the engine on separate springs. Limitation of Cylinder Construction—cont A number of cars support their motors upon auxiliary frames, as, for instance, the De Dietrich, Georges Richard, Pierce, Thomas, etc. These frames obviously have more or less resilience.

It seems to me that the study of inertia and resilience is of primary importance to the automobile engineer. I think the theory has not been completely developed. I know of a number of experimental constructions that seem to have had too much or too little resilience or are not properly disposed or designed.

Henry Souther, M. E., of Hartford, has made a special study of motor connections to the frame, and holds opinions that sound like finality. Will he not tell us how to properly reason on this subject and point out the proper line of progress?

I wonder what Thos. L. Sturtevant has to say upon the subject.

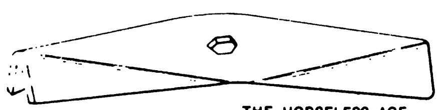
E. J. Stoddard.

A Time-Saving Tire Tool.

Editor Horseless Age:

One of the greatest reasons for dreading a puncture on the road is the waste of time it entails, and one of the most irksome things about removing and replacing the shoe is the time it takes to loosen and tighten the lugs. This is especially true when the thimble nuts do not run easily on the threaded shanks of the lugs, and it is necessary to use a wrench on them.

On small tires they use a butterfly nut, and one day when I was laboriously turning the thimble nuts on my 4-inch tires, it occurred to me that a removable butterfly might be made that would save me a lot of time. My tools and materials are few and meager, but I found in the alley an old iron barrel-hoop, about two inches wide and something over an eighth of an inch thick, which seemed to me just the thing I needed. I broke off—in my vise—a piece of it about five inches long; to be exact, as long as the distance between my spokes at a point an inch and one-half from the felly. On this oblong piece of iron I pasted a piece of paper and at the center thereof drew a hexagon the size of the thimble nut. I drilled out the center of this, and with a three-cornered file filed out the corners of the hexagon until it exactly fitted the nut. Then I placed each of the four corners of the iron oblong in the vise and bent them at right angles, so that the



THE HORSELESS AGE

resulting tool looked like the drawing herewith.

I find that by using this I save a good deal of time and also the corners of the nuts. By using both hands, the nuts can be run up to a tight seat without the use of a wrench.

C. M. C.

LEGISLATIVE AND LEGAL.

New Vehicle Tax Law for Toledo, O.

At the request of Mayor Finch, the city solicitor of Toledo, O., has drafted a new vehicle tax ordinance which will be presented to the City Council at an early date. Under it users of the public highways are taxed according to the following schedule: Automobiles or other motor vehicles, $4 a year; one-horse private carriages, $1.50; any other one-horse vehicles, $2.50; and two-horse private carriages, $3; any other two-horse vehicles, $4; sulkies, $1; bicycles, 50 cents. All money collected under the ordinance is to be used for repairing and cleaning the streets. Licenses are to be issued by the mayor, and the numbers given must be carried in a conspicuous place. The penalty for violating the provisions of the ordinance is to be a fine of not less than $10 or more than $50, or imprisonment for six months, or both. The present ordinance, to enforce which an effort has recently been made by the city authorities, is considered by some attorneys to be defective in that it was passed by the Council under an old law on the statute books which had previously been repealed. For this reason the mayor is anxious to have the new measure become a law as soon as possible.

Mayor Raymond, of Aurora, Ill., has warned the automobilists of that city against exceeding the legal limit of speed.

The police commissioners of Toronto have recently issued orders to the police force to strictly enforce the city ordinance which limits the speed of automobiles to ten miles per hour.

The farmers of Humboldt county, Neb., are considerably stirred over the advent of automobiles into their vicinity and have called a meeting to be held at Falls City on October 1 for the purpose of organizing a society for "mutual protection."

An amendment to the recently adopted automobile ordinance is now in the hands of the committee on judiciary of the Milwaukee City Council, which requires that a white light be carried on the side of the car which will reflect upon the number plate.

MAINTENANCE AND REPAIRS

Sundry Repair Jobs.

BY THE "TROUBLE MAN."

A multicylinder vertical engine was recently brought into the shop which was giving constant trouble through self-ignition. After running for even a few minutes auto-ignition would commence, reducing the power output in a very marked manner. When the spark was cut off the motor would continue to explode for some time, knocking in a distressing manner and producing a very offensive exhaust. Upon inquiry it was learned that this difficulty had been experienced ever since the car had been left out of doors during a cold autumn night, and the cooling water frozen —no such trouble having been experienced before that incident took place.

Another engine of the same make being at hand, and out of use, its heads were removed and substituted for those of the motor in question, when it was found that it operated perfectly, without self-ignition. Assuming that the freezing of the cooling water in the old heads was the cause of the trouble, it would be interesting to know just what changes were produced in the heads to lead to the auto-ignition. Before discarding them, the old heads had been carefully scraped and washed out, but without curing the difficulty. The gas passages, however, could not be completely inspected. The water passages seemed to be perfectly free, and no more rusty than was to have been expected. No previous published instance of such a difficulty has come to notice, but perhaps some reader of the Horseless Age can give a plausible explanation of what actually happened to these heads to lead to their defective action. It has been suggested that minute cracks were opened in the iron between the water jacket and combustion space or passages when freezing took place, and that these became filled with rust, which is rather a poor conductor of heat, and might be rendered incandescent by the heat of the explosion, though the metal walls remained reasonably cool. This incandescent iron oxide would explain the auto-ignition of the charge after the engine had been run a short time.

* * *

An engine of vertical multicylinder construction was lately brought in with valve troubles. Upon examination it was found that one of its mechanically operated inlet valves failed to open on account of its push rod and the valve stem having slipped by one another. The valve stems had worn in their guides to such an extent that some of the valves "wobbled" very badly, failed to seat equally on all sides, and one had actually worn so badly that its push rod missed it and failed to act. It was found that there were no oil holes in the valve stem guides and that they had never had any lubrication, which seems a serious oversight on the part of the designer. The guides, which are cast integral with the cylinder heads, being of small section, there was not enough metal to allow of their being bored out and bushed to fit the valve stems, and the only practical remedy proved to be the purchase of new heads. In these, oil holes were drilled in each guide, and the owner was instructed in regard to their lubrication. Valve stems require oiling just as peremptorily as many other parts of the engine, and owners will do well to observe whether the necessary facilities are provided for this purpose upon their cars.

* * *

Perhaps the most common complaint that comes to the attention of the average "trouble man" is faulty ignition due to weak batteries. All too often cars come crawling into the repair shop, skipping and misbehaving sadly, from no other cause. The ordinary user when he finds that his batteries are weak proceeds to couple up the two sets in series to try to secure current enough to enable them to run a few miles further on the old cells. This expedient may afford him some slight relief, but ordinarily it would be much better if he would connect the two sets in parallel instead of in series. The open circuit voltage of dry cells does not deteriorate so rapidly as to render necessary a series connection of a large number of cells. The resistance of the cells, however, increases somewhat rapidly with use and age, and the depolarizing power of the filling diminishes as current is demanded, so that after a time any attempt to draw the original current from the cells is followed by rapid polarization, although they may still be able to furnish a smaller current without much evidence of fatigue.

By connecting the two sets in parallel only one-half the usual current flow is demanded from each cell, the total battery resistance is much reduced, and the cells will usually last for some time longer.

A switch of neat and effective power is now upon the market, which, in addition to the two points corresponding to the use of each set of batteries separately, has a double point upon which the switch lever may be set, with the result of connecting the two sets in parallel.

The trouble man strongly advises the use of a switch of this kind, and does not believe in connecting the two sets in series, as before stated, one objection to this practice being that the vibrator points are more rapidly worn by the higher voltage current thus produced.

It is rather surprising that manufacturers do not show more uniformity in regard to their battery equipment. A certain single cylinder runabout which employs the highest compression in practical use is furnished with two sets of four cells of small dry battery, while a certain two-cylinder touring car, employing comparatively low compression, is equipped with two sets of five cells. The result is that the former car is constantly in trouble with faulty ignition, while the latter is free from these difficulties. One would think that the manufacturer of the former car would value the reputation of his product for reliability at a higher price than the cost of two cells. The coils of the two cars are the same. A good excess of battery power is one of the most comfortable "failings" that a car can have.

Club Notes.

A. C. A.

About twenty members have signified their intention of taking part in the fall tour to Delaware Water Gap, Philadelphia, Atlantic City and Lakewood. The date for the start has been set as Monday, October 10.

DALLAS (TEXAS) A. C.

A meeting was held in the rooms of the Commercial Club on September 24, at which reports were received from the committees on by-laws, racing and excursions and club runs. Circulars have been issued announcing the automobile events to be held in connection with the fall festival. A series of club runs will be held during the winter as the weather permits.

RHODE ISLAND A. C.

The final club run of the season was held on September 23-24. Starting Saturday morning, the run was made to Worcester, Mass., where lunch was taken at the Hotel Standish. In the afternoon the trip was continued to Barre. Here the club remained over night and the run back to Providence was made on Sunday. A large number of members participated.

BUFFALO A. C.

At a meeting of the board of governors, held on September 25, D. H. Lewis was elected secretary, succeeding F. J. Wagner, resigned. It was decided to change the date for the election of officers from October 12 to January 1. A committee from the club will confer with the Automobile Trade Association in regard to the arrangements for the annual automobile show in March.

SPRINGFIELD (ILL.) A. C.

The club has arranged for a series of dances during the winter months, beginning about the middle of November. A committee from the club waited upon the City Park Board at their last meeting and protested against the regulation which forbids the driving of automobiles in the park after 6 p. m. The board was informed that test actions would be brought if the order is not recalled. The co-operation of the police has been asked to aid the club in its efforts to suppress scorching.

WATERTOWN (N. Y.) A. C.

Organization was effected at a meeting held last week, with the election of L. D. De Cant as president; John Solar, vice-president; Curtis White, secretary, and an executive committee consisting of B. B. Taggart, George McCarten and C. W. Gray. Edward Merrit was elected marshal and H. R. Heusted assistant marshal. The club expects to have an enrollment within a short time of forty members, all owners of automobiles, and proposes to make occasional trips into the country.

HOUSTON (TEX.) A. C.

Some forty members participated in the first club run, which was held on the evening of September 25. The start was made at 7.30 P. M., and a run was made along Telephone Road to Harrisburg and Pasadena, the distance covered being about twenty-four miles. Lunch was partaken of during a stop on the return trip. The following chairmen of committees have been named with full power to fill committees: Finance, C. Bender, Jr.; membership, A. C. Hardesty; entertainment, Spencer Hutchins; rights, rules and regulations, C. W. Hawkins; touring, C. L. Bering; racing, S. E. Bering; W. A. Burkett, captain of club runs.

PHILADELPHIA A. C.

The club held a seventy-six mile endurance run on Saturday, Oct. 1, through Ambler, Norristown, Phoenixville, East Chester and back to Philadelphia. The contestant who completed the course in the shortest time was to be decided the winner, but they were compelled by the rules to comply with the speed laws at all times. Each car carried its full complement of passengers, and was driven by its owner. Because of several claims for time allowances for various reasons, the winners are not yet known. The judges of the contest were: At Philadelphia, Isaac Starr, Jr., and H. Bartol Brazier; at Ambler, Howard Longstreth and G. M. Schell; at Phoenixville, C. J. Gundlefinger and E. L. Bushnell; at East Chester, Joseph Pickerings and Edwin L. McKinstry.

The State Automobile Club, of St. Albans, Vt., held a club run to Burlington on September 21 and partook of a banquet at the Van Ness House.

Vanderbilt Cup Race.

Two developments of the past week threatened to interfere with the Vanderbilt Cup race. The first was that the four Panhard cars constituting part of the French team were held by the New York Customs officials for $18,000 duty. The purpose of the shipment had not been declared in consigning them from France, and for this reason the authorities would not pass them without duty charges. For a time it looked as if the cars would not take part in the race. The French ambassador at Washington made a request that they be admitted for the race, and they were finally entered under bond, to be deported in one month from date of entry.

The second development was the filing with the Board of Supervisors of Nassau County of a protest against the action of the board in granting the use of the roads for the race, signed by 188 members of the People's Protective Association, residents of the county. In reply to this protest the board has issued a letter defending its action and appointing Tuesday, October 4, at 10 A. M., as a time when a hearing will be given the petitioners. The letter sets forth that under the State law of 1904 they are empowered to waive the speed restrictions temporarily and set apart highways for speed test purposes; that the A. A. A is spending $5,000 in the improvement of the roads along the course; and that the race will serve to direct a considerable amount of attention to Nassau County, with beneficial results. It is thought that there will be little opposition expressed against the race at the meeting.

Racing Notes.

The Warsaw (N. Y.) Automobile Club will hold a road race on October 5.

The Chicago Motorcycle Club held a five-event race meet at Garfield track on October 1.

The A. A. A. has sanctioned the race meet to be held at Rockford, Ill., on October 6 and 7.

The International Motor Cycle race at Dourdan, France, on September 24, was annulled by the committee because of the large number of tire punctures sustained by the competitors, caused by tacks strewn along the course.

Because of his failure to appear at the Chicago meet on September 30 and October 1, after having contracted to do so, the Chicago A. C. has entered a formal protest against Oldfield's appearing under the sanction of the American Automobile Association at any meet hereafter. Oldfield's disbarment from the association also has been asked.

Commercial Vehicle Notes.

The residents of the Pecos Valley, N. M., are arranging to establish an automobile passenger line between Torrance and Roswell in case the Santa Fe Central R. R. does not extend its service to these points within a short time.

Articles of incorporation have been filed for the Oregon Auto Despatch Co., of Portland, Ore., by H. W. Goddard, C. A. Bell and A. C. McIntosh. The company proposes to operate a service of electrically propelled baggage wagons.

An International Incident.

We recorded in our last issue that Hugh Gurney, Third Secretary of the British Legation, was arrested in Lenox, Mass., on Saturday, September 26th, for driving a motor car faster than the legal limit, and that Judge Phelps fined him $25 for contempt of court in refusing to plead, and $25 for breaking the speed law. It develops that the Judge in attempting to uphold the dignity of the Massachusetts Court, was handicapped by a lack of knowledge of international law, which he had been unable to acquire while working at his trade as tinsmith. He has had this error pointed out to him by those higher in authority, and his apology has been forwarded, together with complete records of the case, through the proper channels, to the British Ambassador. Mr. Gurney in turn has offered his apology to Governor Bates, and has expressed his regrets for any infringement of the speed laws.

Much criticism has been aimed at Mr. Gurney for demanding the privileges extended by international law, and even by his English brothers it is said that the simplest, quietest plan would have been to waive his privilege and pay his fine. There has been talk of demanding his recall, and also talk of England demanding the punishment of Judge Phelps. The prospect of international complications has considerably diminished, however, since it was learned that Mr. Gurney was not driving the car when the arrest was made, but assumed the responsibility and demanded diplomatic privileges to shield an 18-year-old friend of his who was driving at the time, and who does not enjoy the immunity from arrest which international law insures to members of a foreign legation.

Trade Literature Received.

The Dann Bros. Co., New Haven, Conn.—Pamphlet on bent woodwork for automobile bodies.

The Utility Co., 231 Greenwich street, New York City.—Folder calling attention to their "Squeal Skin" tire bands.

The Winkley Co., Hartford, Conn.—Catalogue of oil cups and brass specialties.

The Fellows Gear Shaper Co., Springfield, Conn.—Illustrated handbook on the use and construction of their gear cutting machinery.

The De. E. Whiton Machine Co., New London, Conn.—Pamphlets regarding their centering machines.

Standard Roller Bearing Co., Philadelphia, Pa.—Catalogue of Grant axles and wheels; general catalogue of roller bearings.

E. J. Willis, 8 Park Place, New York City.—Illustrated folder sheets of automobile clothing and supplies.

ROAD INSPECTION BY AUTOMOBILE IN CANADA.

Automobile Road Inspection in Canada.

A party of about eighty, comprising members of the automobile clubs of Toronto and Hamilton (Ontario), members of the Wentworth County Council, wardens and councils from adjoining counties, members of Parliament, etc., made an automobile trip over the good roads of Wentworth county, Ontario, on Tuesday, Sept. 13th. It was on the occasion of the annual entertainment marking the close of the term of office of county officials, and the idea was to combine business with pleasure and give the county councillors a chance to see how and where the good roads appropriation is being expended. Besides, the Provincial Commissioner of Highways, A. W. Campbell, desired to have a look at Wentworth's good roads, that he might hold that county up as an example to others less progressive, and this was taken into consideration when arranging for the trip. The idea of the inspection tour originated with Warden Kenrick, of Hamilton, and was enthusiastically supported by the two automobile clubs.

Fifteen cars were brought over from Toronto to Hamilton for the occasion, and these, with seven or eight Hamilton cars, were sufficient to carry all the officials desiring to go on the trip, and made the greatest automobile procession ever seen there before. The procession started from the Court House Square in Hamilton about ten o'clock A. M. for Waterdown, going via George street and Dundurn. The roads were a trifle dusty, but as the majority of the occupants of the cars were dressed for the ocacsion, that did not mar their pleasure. When Waterdown High School was reached the scholars were lined up at the side of the road and gave the party three cheers as it passed. In fact, the residents were out waiting and watching for the automobiles all along the route. After a wait of a few minutes at Waterdown the party went to Clappison's Corners, where a stop was made to witness the operation of the county's road roller. Then the run was continued to Greensville, Bullock's Corners and Dundas. Different roads were taken, and consequently there was a wait at Dundas until the machines all got together again. Kitchen Corners, Law's Mills and Mineral Springs were visited on the way to Ancaster, which was reached shortly after 12 o'clock. The run down the mountain from Ancaster to Hamilton was rather exciting, and on one of the machines often too short, and the edges of the pipe an axle broke on coming down the mountain, but the passengers were picked up by the other cars, and there was little delay. Hamilton was reached before one o'clock, thirty-one miles having been traversed during the forenoon. The machines were lined up in front of the Waldorf and attracted a big crowd.

Here the party partook of a dinner that had been prepared for them, after which Warden Kenrick made a few remarks and read a telegram from Hon. George W. Ross to the effect that the government had decided to grant an additional sum of $20,500 for road improvement purposes, which had been requested by a delegation from the County Council which visited Toronto a short time ago.

After dinner the party proceeded to Stony Creek, where the mountain was climbed to Elfrida. Climbing the steep ascent was rather a difficult task for most of the machines, and in a few cases the passengers had to foot it. From Elfrida the party went to the asylum grounds, where a photograph (shown herewith) was taken, and then the return to the Mountain View Hotel was started upon. At the hotel a lunch was served and speechmaking indulged in. Most of the speakers were very enthusiastic regarding the condition of the roads they had passed over, and paid their compliments to the officials responsible for their maintenance. During the course of the fifty-mile run few bad roads were encountered, and the majority of these were township crossroads not controlled by the county. However, the automobile trip led

only over the best roads found in the county, and much road building is still to be done, but it is expected that with the additional aid granted by the government work in this line will be pursued vigorously until all the roads in the county are in good shape.

There were only two mishaps during the run, the breaking of an axle, as already mentioned, and the bursting of a tire shoe, caused by running over an upturned horseshoe. One runaway was caused, the horse standing untied at the side of the road. The following furnished their cars for the run: Dr. Doolittle, J. C. Eaton, Frank W. Bailey, J. W. Corcoran, J. J. Main, W. A. Kemp, G. Gooderham, A. J. Jackson, A. H. Webster, A. E. Chatterson, J. C. Copeland, J. Parker, H. G. Smith, all of the Toronto A C., and S. O. Greening, J. R. Moodie, S. F. Malloch, Jas. Moodie, L. Sherk, John Moodie and D. Marshall, all of the Hamilton A. C.

Exports in August.

During the month of August last, the exports of automobiles and parts from the United States were valued at $168,303, as compared with $171,132 for the same month last year. The exports for the eight months ending with August were as follows during the last three years: 1904, $1,322,499; 1903, $1,049,311; 1902, $786,137.

New Incorporations.

The Columbia Garage Co., Charlotte, N. C. Capital, $3,000. Incorporators: J. M. Cantey, C. H. Evans and C. D. Miller.

Chicago Automobile Manufacturing Co. Capital, $50,000. Incorporators: M. F. Mogg, M. E. Mogg, W. A. Whirlwall.

Mineapolis Automobile Co., Minneapolis. Capital $10,000. Incorporators, E. G. Timme, L. S. French and A. E. Paegel.

The Michigan Motor & Machine Co. Incorporators: William F. Koeller, Peter Zubrigg, Messrs. McCormick, Freeman and Krestchmann.

Hyne Motor Co., Plainfield. N. J. Capital $25,000. Incorporators, Harrison Coddington, Charles F. Fulmer, Charles F. Hyne and William B. Harsel.

"Squeal-Skin" Tire Band.

A new tire band made of selected Spanish hog skin and specially tanned for the purpose, has been placed upon the market by the Utility Co., 231-235 Greenwich street, New York City. The band is not molded hard, but is pliable, thus fitting closely to the surface of the tire. The band is claimed to be tougher than so-called rawhide leather; and the eyelets and lacing are said to be very strong, so they will neither break nor pull away. The band is readily attached and detached.

The Calorimetry of the Gases Exhausted from an Internal-Combustion Engine.

(Abstract from paper read by B. Hopkinson before Section G of the British Association, Cambridge meeting.)

So far as I am aware, in all gas-engine tests hitherto made, the indicated work, the heat in the cooling water and the calorific value of the gas used are the only quantities which have been directly measured. The balance of heat unaccounted for has been put down to exhaust gases, radiation and conduction. In some cases an attempt has been made to separate the last-mentioned items by estimation, but these attempts have been very rough in character and have led to very divergent results.

The special point of the tests to be described is that the exhaust gases were passed through a calorimeter and so cooled to near atmospheric temperature, the heat rejected by them being measured. In this way a complete heat account has been obtained, in which the only item not directly determined is the loss by conduction and radiation.

The first set of tests were made on a Crossley engine in the Engineering Laboratory, Cambridge, giving about 5 h. p. on the brake. The following are the particulars of the engine: Speed, 250 revolutions per minute; cylinder diameter, 7½ inches; stroke, 9 inches; compression space, 143 cubic inches; ignition, hot-tube with timing-valve. Cylinder only is water jacketed, piston and exhaust valve being uncooled.

Cambridge coal gas was used, having an average calorific value of 680 British thermal units at 0° Cent. and 760 mm., of which about 70 British thermal units are the heat evolved in condensing and cooling the steam produced in the explosion.

The calorimeter for the exhaust gases is shown in Fig. 1. It consists of a section of flanged cast-iron pipe fitted with baffle-plates, by which the gases are caused to pass several times backward and forward through its length and finally to bubble through the water collected at the bottom. The water, after passing through the jacket surrounding the calorimeter, meets the exhaust gases in a fine jet and is partly caught by them and carried round with them, and partly trickles down the baffle-plates. It was found that in this way the gases could be cooled, with the engine fully loaded, down to 120° F. or less, the cooling water rising in temperature from about 60° to 90°. This instrument was designed of ample proportions, so that it should be certain to work satisfactorily; there can be no doubt that it is big enough to serve for a much larger engine. In a test on an engine of double the power—to be described later—the calorimeter was very much smaller and the results quite satisfactory.

There is no need to particularize the methods of indicating the engine, or of measuring the amount and temperature rise of the jacket water, about which there was nothing peculiar. Some pains, however, were taken to secure accurate measurement of the heat put into the engine. The gas was measured with a wet and dry meter in series, and both meters were calibrated with a standard holder at the rate of flow of gas actually used. The calorific value of the gas was determined with a Junker calorimeter at the time of the test on the engine. The amounts of heat stated as having been supplied to the engine are probably correct to within 2 per cent.

In the first three trials there was no load on the engine, and practically all the explosions were preceded by one or more scavenging strokes. In the other trials, the engine was nearly fully loaded, so that very few of the explosions were preceded by a scavenging stroke. The release pressure in the eighth column is the pressure at a point one-tenth of the stroke short of the out-center at or about which point the exhaust valve begins to open. The energy of the gases at release is calculated from the release pressure on the assumption that we have then perfect gas mixed with the steam produced by the explosion, the amount of which is known from the gas analysis. The heat of condensation and cooling of this steam is added to the heat in the gas considered as perfect gas. The actual energy is probably more than this, since the steam and CO_2 are almost certainly some-

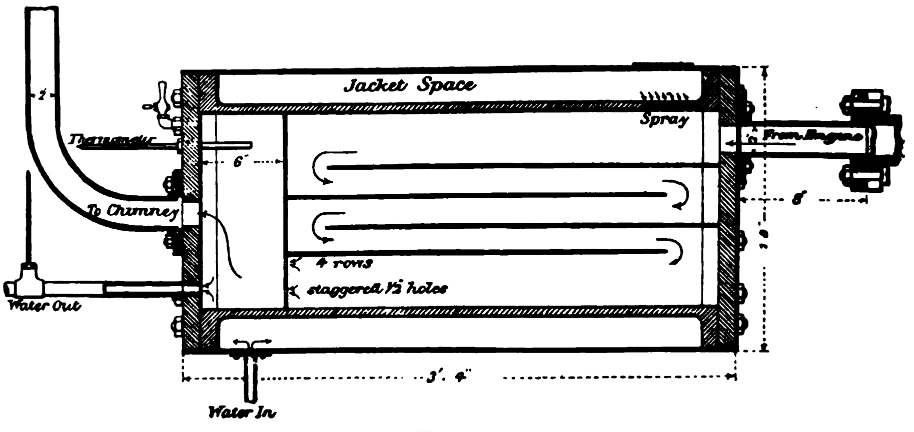


FIG. 1.

TABLE I.

Heat Value of Gas, B.Th.U. per Explosion.	Indicated Work, B.Th.U. per Explosion. p. c.	Heat to Jacket Water.	Heat to Exhaust Calorimeter.	Heat up Chimney.	Balance Unaccounted for. p. c.	Explosions per Minute.	Release Pressure, Pounds per Sq. In. in Absolute.	Energy of Gases at Release, B.Th.U. per Explosion.	Release Temperature, Cent.	Liner Temperature, Fah.	Temperature of Jacket Water (Exit) Fah.	Temp. of Exhaust Gases, after passing Calorimeter, Fah	
13.3	2.5 = 19	5.5	4.0	...	1.3 = 10	32	49	6.4	780	102	72	80	
18.5	3.4 = 18½	8.3	5.2	...	1.6 = 8½	23	53	7.5	870	106	72	80	
16.0	2.9 = 18	6.4	5.2	0.4	1.1 = 7	32	56	7.7	930	86	70	100	Late ignition.
13.0	2.7 = 21	5.1	4.1	0.1	1.0 = 8	110	46	6.0	900	122	80	105	
12.6	2.5 = 20	4.2	4.6	0.1	1.2 = 9½	117	43½	5.5	800	156	200	105	
15.1	2.9 = 19	5.9	4.2	0.2	1.9 = 12½	116	45	6.0	880	126	92	118	
15.0	2.8 = 18½	6.4	4.0	0.1	1.7 = 11½	120	45	6.0	880	126	81	112	
16.1	2.7 = 17	6.4	4.8	0.1	2.6 = 16	91	53	7.2	1250	103	75	107	Late ignition.
15.2	2.65 = 17½	5.[illegible]	4.2	0.4	2.2 = 14½	111	52	7.0	1200	100	82	144	Late ignition.

lissociated at the temperature of re- The temperatures of release are ted from the suction temperature ıed) and release pressures. In the the light-load trials the suction temre cannot be far different from the ature of the gas before admission, have taken a round figure of 27° or 300°. absolute. In the full-load the suction temperatures are very ain. I have drawn on Professor ll's measurements for these, and have ed a round figure of 77° Cent. (350° te) for Nos. 4, 5, 6, and 7, and 127° (400° absolute) for the others in the release temperatures are higher. be seen that the temperature measnts are extremely rough, but I have based conclusions on their relative of magnitude in the several trials, hat is, no doubt, correctly shown. liner temperature" is that of the outer the cylinder liner where it projects nt of the cylinder. Since this portion water jacketed, is not exposed to the and is in all trials except No. 5 hotan the jacket water, it must receive at entirely from the piston, which into contact with it on the out-center. mperature is, in the case of the fulltrials, a rough indication of the heat given to the piston.

following points are worthy of note: The gases lose much heat between reand entering the calorimeter. Table ıows the difference between the estito the calorimeter and sent up the ıst pipe. The actual difference is er, since, as already explained, the y at release is certainly under-esti-l.

e gases lose heat after release, partly ıe exhaust valve and passages, and to the cylinder walls in the exhaust e of the piston. The latter part of the oes to swell the jacket losses; the foris largely radiated away from the hot ıst valve. We should expect the amount of loss to depend mainly on the difference of temperature between the gases and the passages or cylinder walls. Thus, high-release temperatures should mean much loss of heat, and in the light-load trials, where the passages are fairly cool, the loss should be greater than in the full-load trials, where they are kept hot. These conclusions are confirmed by Table III.

The smallest losses are in trials 4, 5, 6 and 7, where the release temperature is low and the passage hot. Then come Nos. 1, 2 and 3, where, though the release temperature averages about the same as in 4, 5, 6 and 7, the passages are cold and the losses undoubtedly higher. Finally, we get the largest losses of all in Nos. 8 and 9.

2. The balance unaccounted for seems to consist mainly of radiation from the exhaust valve. The biggest balances are those in trials Nos. 8 and 9, where, by reason of the late ignition, the release temperature is high. The exhaust valves in these trials are observed to be very hot. It will be noticed that in these cases the temperature of the liner, and therefore the piston, was lower than in the other full-load trials; and the temperature of the jacket water was by no means excessive. In No. 5, although the jacket water was nearly boiling, the balance is low, because here the exhaust valve was fairly cool.

3. There is no marked improvement in efficiency caused by scavenging.

4. The piston is cooler with the late ignition. Compare the liner-temperature of Nos. 8 and 9 with the other full-load trials Nos. 4, 6 and 7.

Owing to the large balance of heat unaccounted for, ranging in the full-load tests from 8 to 16 per cent. of the total, which cannot be measured, the tests made on the small Crossley engine are not very satisfactory. Moreover, in those tests the calorimeter was very much more bulky than was necesssary for the purpose. It appeared to me from consideration of the results that the lost balance of heat must have gone mainly in radiation from the exhaust valve and other uncooled parts of the engine. I therefore made a similar trial on a second and larger engine in the laboratory, in which, as it had a water-cooled exhaust valve, it appeared probable that the radiation loss would be substantially less.

This engine is by the Forward Engineering Company, and gives about 10-h.p. on the brake. The following are the principal particulars of it: Speed, 250 revolutions per minute; cylinder diameter, 7 in.; stroke, 15 in.; compression space, 140 cubic inches; ignition, hot-tube with timing-valve; cylinder and exhaust valves are water jacketed, piston being uncooled. This engine compresses to 150 lbs. absolute, against 70 lbs. in the Crossley.

In the case of this trial the exhaust gas-calorimeter was made very much smaller. Fig. 2 sufficiently shows its construction. The water is sprayed through two flat-flame gas burners into the exhaust pipe, so that the exhaust gases immediately on leaving the engine encounter a sheet of cold water,

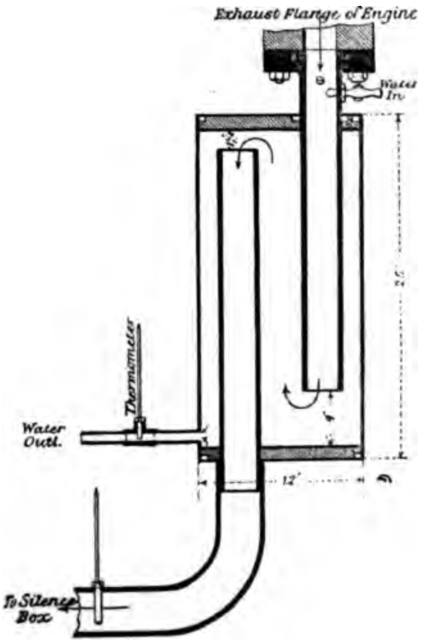


FIG. 2.

TABLE II.

er of trial...........	1	2	3	4	5	6	7	8	9
e temperature........	780	870	930	900	800	880	880	1250	1200
erature of passages...	cold	cold	cold	hot	hot	hot	hot	hot	hot
in passages..........	2.4	2.3	2.1	1.8	0.8	1.6	1.9	2.8	2.4

and they are further cooled by churning up the water at the bottom of the calorimeter.

The gases after leaving the calorimeer, were taken into the ordinary exhaust box of the engine, which was provided with a drain and acted as a water separator. It was found, however, that very little water was carried over from the calorimeter by the gases. With this apparatus, the gases were cooled down to a temperature of 120° Fahr. or less, the engine being fully loaded, and the apparatus itself occupied but very little more space than the bit of exhaust pipe which it replaced. The results of a trial made on this engine are given in Table III.

TABLE III.

	B.Th.U. per Explosion.	Per cent.
Jacket water	7.0	32
Exhaust calorimeter	7.5	34.5
Heat up chimney (estimated)	0.3	1.5
Indicated work	5.7	26
Balance unaccounted for...	1.3	6
Heating value of gas used..	21.8	100.0

Temperature of exhaust gases after pass-of jacket water at exit, 105° Fahr. Explo-of jacket water at exit ,105° Fahr. Explosions per minute, 106. Indicated horsepower, 14.2.

The gas measurement in this trial is correct to within 2 per cent.

It will be seen that the heat lost by radiation and conduction certainly does not exceed 10 per cent. of the heat put into the engine, and is probably a good deal less. I have made a large number of trials of the same kind on this engine, in all of which the balance unaccounted for is less than 6 per cent. even when the jacket water was very hot. This seems to me a sufficiently good result to justify trying this method of testing engines on a larger scale, especially having regard to the very compact character of the exhaust-gas calorimeter. In ordinary steam engine trials it requires extraordinary precautions to get a closer agreement than this between the heat put in and the heat rejected, *plus* indicated work. Moreover, I think it is reasonable to suppose that in a large engine with a water-cooled piston the loss unaccounted for would be smaller still. Of course, the precise design of the calorimeter for the exhaust gases would have to depend on the arrangement of engine and piping in each case; but there is no doubt, I think, that the secret of success is to spray a sheet of water under high pressure into the exhaust pipe close up to the engine. The gases rushing out break up this sheet into minute drops, and are thus very effectually cooled. The only difficulty then is to separate the suspended water from the gas, and to collect and measure its amount and rise in temperature. The separation is by no means so difficult as I had anticipated, and could no doubt be effected in a box somewhat similar to that which I have shown in Fig. 2. It will be found, on calculating the heat contained in the gas after leaving the calorimeter, that this item does not become seriously high so long as the temperature of the gases is below 140° Fahr. I find, however, that the radiation and conduction from this particular calorimeter become rather large at temperature above 115°. But it is easy to determine the amount of this by a separate experiment.

Pittsburg Race Meet.

The Pittsburg Automobile Club held its first race meet at Brunot's Island track on September 30 and October 1. The chief feature of the first day proved to be the exhibitions by Barney Oldfield in the Peerless "Green Dragon," who on two occasions completed a mile in 60 seconds, thereby establishing a local record.

The first event was a five-mile race for touring cars under 25 h. p. There were six starters. George E. Turner, driving a Peerless car, captured first place, in 6:45½, while second place was taken by W. N. Murray, in a Pope-Toledo. These cars finished in the same positions in the ten-mile event for stock cars of under 35 h. p., the time of the winner in this case being 13:14.

There were three starters in the two-mile race for cars under 9 h. p. to be driven with full road equipment—a Peugeot driven by George H. Flinn, a Cadillac driven by D. P. Collins, and a Stevens-Duryea by M. F. Leslie. They finished in the order named. The winner's first mile was made in 2:05¼ and the second in 1:46½.

Webb Jay (White) won the five-mile race for cars under 16 h. p. in 8:35, with E. Haas (Pierce) finishing second.

It was in his five mile exhibition ride against time that Oldfield succeeded in placing the local record at one minute flat. Later, in another attempt, he again equalled the figure.

The fifth event, a five mile race with no restrictions, was won by Oldfield driving a 24-h. p. Peerless in 6:37¼. The other contestants were Webb Jay (White) and E. H. Beldin, who finished second and third, respectively.

The final event of the day was a five mile handicap, in which there were sixteen starters. Eight cars ran in a heat and the first two in each came together in the final. The event was won by Oldfield in a 24-h. p. car, in 5:47.

SECOND DAY.

The second day's racing provided much closer finishes than did that of the day before, and was, therefore, of greater interest to the spectators. Notable among these finishes was that of the five mile handicap, the final race on the programme. The large number of starters made it necessary to run the event off in three heats. In the first, W. N. Murray (Franklin) won easily by half a mile. The contest for third position was very close and much interest centered in it. It was not until the last quarter of the fifth mile that W. C. Cook (Duryea) closed up on and passed A. L. Banker's Pierce and D. P. Collins' Cadillac, winning the place by only a few lengths.

The second heat went to Lester Wilson (Pierce), Ed Kneeland (Pope-Toledo), starting from scratch, winning second place. Oldfield was scratch man in the third heat, allowing 15 seconds to G. E. Tayner (Peerless) and 25 seconds to Webb Jay (White). In the back stretch, while in the last lap, Jay led Oldfield by about three-sixteenths of a mile, but the latter gradually closed the distance between them, finally passed his rival within twenty yards of the finishing line, and won by a few lengths only.

Oldfield in an exhibition three mile ride succeeded in lowering the local record for a mle to 58 1-5 seconds.

It was estimated that about 5,000 people attended the meet on each day.

A summary of the second day's racing follows:

Two mile race for touring cars under 25 h. p., Webb Jay (White), first, G. E. Turner (Peerless), second. Time, 2:46.

One mile for cars under 10 h. p., D. P. Collins (Cadillac), first; Geo. Flinn (Peugeot), second. Time, 2:12¾.

Two mile "pick-up" race, Webb Jay (White), first; G. Turner (Peerless), second. Tice, 3:14.

Two mile for touring cars under 17 h. p., Webb Jay (White), first; Geo. Stranahan (Franklin), second. Time, 3:35.

Five mile exhibition, Oldfield (Peerles).

Ten miles for touring cars under 36 h. p., Oldfield (Peerless), first; G. E. Turner (Peerless), second. Time, 10:40 1-5.

Three mile exhibition, Oldfield (Peerless). Time, 2:55 3-5.

Five mile open handicap, Oldfield Peerless), first; L. Wilson (Pierce), second. Time, 5:25 3-5.

The Run to the White Mountains.

The motorists who assembled at the Mount Pleasant House, Bretton Woods, N. H., on October 1, had ridden for two days in all sorts of weather and over roads much the worse for rain. Some fifty enthusiasts, however, from various parts of New England withstood the trials of the trip. The first to arrive were H. Stanley, Allen and Mr. Inglis, in a Columbia. At the banquet, on Saturday evening, Harlan Whipple, of Andover, Mass., presided, and W. J. Morgan acted as toastmaster.

"George Parker has got so that he handles his automobile first rate, and has snice its arrival been giving his friends a ride, which they enjoy very much," says the Leeds (N. D.) *News* The item ought to be reassuring to the local population.

MINOR MENTION

erry Gable is to erect a garage on East ton street, Frankfort, Ind.

he R. E. Olds Co., Lansing, Mich., has ıged its name to Reo Car Co.

oman & Schultz have taken the New < agency of Marion Motor Car Co.

is said that there are between fifty and / automobiles owned in Spokane, Wash.

xty-five automobiles had been regis- d in Jacksonville, Fla., on September

ıe Angier Co., 45 Columbus avenue, on, are importing a French spark plug ew design.

p to September 23, thirty-one auto- ile permits had been issued by the city of Birmingham, Ala.

ıe Jos. N. Smith Co., of Detroit, have ntly put out a liquid polish for the l parts of automobiles.

ıe Ford Motor Car Co., of Detroit, will e this week into their new factory at ıbien and Brush streets.

ıe C. B. & Q. Railroad have, within the week, received and put in operation Olds track inspection cars.

ıe Gilbert Manufacturing Co., of New en, Conn., will manufacture a line of mobile clothing during the coming year.

C. Cryder has resigned as president of Consolidated Motor Co., of New York, L. C. Palmer has been elected to the ion.

m Cooper has become general sales t of the Matheson Motor Car Co., of oit, Mich., succeeding F. H. Fowler, ned.

. H. E. Thomas, of Chicago, is re- d to have placed an order with the mobile Co. of America for a 90-h. p. g car.

thur J. Wyman, an instructor in Har- University, was struck and killed on ember 28 by a car driven by Leon ıs, a student in the institution.

ıy & Davis, of Amesbury, Mass., are ring the automobile trade that they patents which cover the "Bullet" lamp will proceed against infringers.

learn that Hamilton Carhart, of De- is to make an extended European tour ıgh England and the Continent in his ırd car during the next few months.

H. Baker, of Boston, accompanied by l engineer, is engaged in laying out an nobile road between Poland Springs, and the White Mountains district.

ıs. E. Miller, of 97 Reade street. New city, has recently enlarged his cap clothing department and has added ıl new styles to his line of goggles.

The Snell Motor Car and Truck Co., of Toledo, expect shortly to have their first motor truck in operation. The company will manufacture gasoline trucks for three and five-ton loads.

Four automobiles have been stolen within the past month in Chicago, the last being that of Shirby High, who had left his car standing in front of a theatre while he witnessed the play within.

Charles Willeford, who drove the Winton car which was used by General McArthur during the recent army manœuvres in California, states that the car stood the service test satisfactorily.

Lou H. Mortsolf, formerly connected with the Clinton Cycle Co., of Frankfort, Ind., has taken a position with the Headson Tool Co., of Lafayette, as manager of their automobile department.

As the result of a collision between a trolley and a large touring car in New York city on September 29, the trolley was derailed and twenty of the passengers more or less hurt. The automobile was wrecked.

James M. Carpenter and Percy Eaton, of Pawtucket, R. I., have been sued for $2,000 damages by Frank O'Brien for injuries received when he was struck by a car owned by the former defendant and driven for him by the latter.

Commissioner Gilman, of the Department of Public Safety of Rochester, is preparing testing courses for automobilists who desire to know whether they are exceeding the legal limit. Measured distances, marked by stones, will be set off along the park drives.

Professor G. E. Bailey, a mining engineer of San Francisco, is soon to start with an automobile on a prospecting trip through the Death Valley region. The intense heat of this locality has hitherto made it difficult to carry sufficient water and other supplies.

A. L. Dyke writes that papers have been filed incorporating the A. L. Dyke Motor Car and Supply Co., of St. Louis, under the laws of Missouri, with a capitalization of $10,000. The company will carry on a garage and general supply business.

The Columbus (Ohio) Motor Vehicle Co. has secured a postponement of the hearing on the application to have a receiver appointed for them, and will endeavor to effect a settlement with the creditors without going through bankruptcy proceedings.

A number of automobilists of Aurora, Ill., placed their cars at the disposal of the Y. W. C. A. on September 23. The public were taken for short trips through the city street for which a small charge was made. The association is said to have realized a neat sum from the venture.

Members of the City Council of Bloomington, Del., who are now considering an automobile ordinance, were taken for rides in cars owned by members of the Delaware Automobile Association on September 28, for the purpose of demonstrating to them the controlability of motor cars.

F. S. Boyd, of Cambridge, Mass., who was fined $10 recently for covering the number tag on his car with an adhesive substance to which the dust collected and thereby obscured the figures, has decided to test the constitutionality of the State automobile law by carrying his case to the Supreme Court.

Chas. Jarrott & Letts, Ltd., of London, write us, under date of September 16, that they expected to start two Oldsmobiles on September 24 on a thirty days' test tour through England and Ireland. It was expected that the cars would cover 100 miles each day, making the total distance 3,000 miles.

The West Side branch of the Y. M. C. A. of New York City will conduct a chauffeur's school during the coming winter months. Instruction in the construction and operation of the various styles of cars will be given in garages about town, and after a time a chauffeurs' employment agency will be opened.

At a meeting of the North Shore (Mass.) Automobile Club last week the following officers were elected: President, W. D. Denegre; vice-president, Dr. C. T. Parker; secretary, C. C. Walker; treasurer, Quincy A. Shaw, Jr.; Henry P. McKean, Arthur Silsbee and Frank Seabury, with the officers, constitute the executive committee.

The Rogers Automobile Co. was organized in Springfield, Mass., on September 27, to manufacture automobiles, and a charter of incorporation will be asked for. The incorporators are: W. H. Rogers, Dr. James P. Hillard, Dr. Edgar G. Hubbell, W. H. Sherman, all of Springfield, and C. M. Woodward and Lewis F. Ivers, of W. Springfield.

A charter of incorporation has been applied for for the McClintock Automobile and Engine Co., of Kansas City, with a capitalization of $375,000. The company propose to manufacture a car designed by D. L. McClintock and are now looking for a site on which to erect a plant. The directors are: Hiram Landrus, Edwin Bond, Fred J. Close and D. L. McClintock.

Mrs. Georgia Chamberlain, of Kansas City, Mo., is suing the Lincoln Park Commissioners of Chicago for $30,000 damages. On the evening of July 30th she was riding in a car with several friends, along the park boulevard when the machine struck a large boulder in the middle of the road it is asserted, and Mrs. Chamberlain was thrown from the vehicle into the street and severely injured.

The Peerless Motor Car Co., of Cleveland, O., write us that they have bought a track of land at the corner of Quincy and Oakdale streets and have let contracts for a two-story fireproof building 248 x 45 feet to be used as a factory and machine shop. Although it is planned to eventually move the entire plant to this location, the office and assembly rooms will remain for a time at the old address.

MOTOR VEHICLE PATENTS.

United States Patents.

770,795. Pneumatic Tire Cover.—C. B. Buxton, of Palmerston North, New Zealand. Sept. 27, 1904. Filed July 13, 1903.

The invention consists in forming the cover of an outer and inner layer of rubber with a sheet of fine wire-gauze placed between them, and the whole solidified together by vulcanizing.

770,791. Vehicle Tire.—William E. Andrew, of Atlantic Highlands, N. J. Sept. 27, 1904. Filed March 25, 1903.

770,936. Motor-Vehicle.—W. S. Simpson, of London, England. Sept. 27, 1904. Filed Dec. 7, 1903.

An auxiliary detachable propelling apparatus for bicycles and other vehicles which can be readily connected to and disconnected from a bicycle or vehicle when desired. The auxiliary driving apparatus is so arranged as to be completely equipped with appurtenances for attachment to a bicycle or vehicle and driving the same. By this invention all the vibratory motions of the motor-engine and the concussions on the supporting wheel due to inequalities of the road will not be communicated to the bicycle or vehicle, thus making the riding more pleasant than when the motor is part of the vehicle.

771,070. Muffler.—William J. Hewitt, of Delmonte, Cal. Sept. 27, 1904. Filed March 22, 1904.

A helicoidal fan (screw propeller) is arranged in a cylindrical muffler casing and driven from the engine, "to draw the exhaust gases from the cylinder," thus reducing back pressure.

771,046. Variable Speed Mechanism.—William B. Custead, of New York, N. Y. September 27, 1904. Filed May 19, 1904.

The mechanism comprises in a general way means—such, for instance, as a crank—for converting rotary motion into reciprocating motion, connected to means—such, for instance, as a crank and link—for varying the amount of such reciprocating motion, and a reversible grip mechanism and drum for converting the reciprocating motion into rotary motion and means for determining the working stroke of the grip to determine the direction of the rotation of the drum.

771,176. Steam Engine.—Oscar F. Rodehaver, of Pittsburg, Pa. Sept. 27, 1904. Filed February 23, 1904.

This invention relates to engines having twin cylinders connected to a common shaft, and has for its object the provision of an engine of novel form wherein two cylinders having pistons connected to a common shaft are supplied with steam at a high and low pressure, the high-pressure steam being admitted on one side of each piston and the low-pressure steam on the other side of each piston. A valve of novel form is used, adapted to deliver steam under high pressure to one side of the piston and to transfer the steam from the high-pressure to the low-pressure side of the piston. The valve is of the revolving type and is located in a steam chest at the side of and between the two cylinders; it is driven from the crank shaft through a set of spiral gears.

770,820. Variable Speed Transmission Gearing.—Thornton B. Rennell, of Denver, Col. Sept. 27, 1904. Filed July 3, 1903.

771,190. Pneumatic-Tire Guard.—Laurent Vanderperre-Simon, Brussels, Belgium. Sept. 27, 1904. Filed July 17, 1903.

769,402. Vehicle. Edward J. Pennington, Cleveland O. September 6. Filed January 18, 1904.

770,840. Thrust-bearing. — Walter C. Baker, Cleveland, Ohio. Sept. 27, 1904. Filed July 25, 1901.

770,872. Explosive-Engine. — Heinrich Söhlein, Wiesbaden, Germany. Sept. 27, 1904. Filed Oct. 4, 1899.

770,927. Ignition-Plug for Explosive-Engines. William Roche, Jersey City, N. J. Sept. 27, 1904. Filed Dec. 4, 1904.

771,077. Change-Speed Gearing.—Abraham B. Landis, Waynesboro, Pa. Sept. 27, 1904. Filed Apr. 18, 1902.

771,095. Gas-Engine.—Eugene C. Richard, Detroit, Mich. Sept. 27, 1904. Filed Feb. 18, 1902.

771,150. Variable-Speed Power-Transmitting-Device.—William F. Howe, Chicago, Ill. Sept. 27, 1904. Filed Dec. 17, 1903.

771,156. Valve for Pneumatic Tires.—John E. Keller, Jr., Litchfield, Conn. Sept. 27, 1904. Filed Dec. 29, 1903.

771,175. Vehicle-Wheel. — William C. Potts, Harrisburg, Pa. Sept. 27, 1904. Filed Feb. 2, 1904.

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Public Warning.

We note with regret that the growing competition in the automobile publishing business seems to have an adverse effect upon the morals of those engaged therein, and that certain publications have very little respect for property rights. The *Cycle and Automobile Trade Journal*, of Philadelphia, publishes in its October issue, on page 110, a line cut which is reproduced from a cut appearing on page 126 of the HORSELESS AGE of August 10 last. This cut was made from a drawing made in our office and protected by copyright, the same as all other original matter appearing in each issue. No permission has been given to any one to reproduce this cut, and the cut and explanatory key in the *Cycle and Automobile Trade Journal* were, therefore, stolen from our columns.

In the *Automobile Magazine* for October, on page 791, appears an article, "What is the Best Size of Wheel?" signed by Professor Jules Demorest. The article is reproduced word for word from page 498 of the HORSELESS AGE of November 11, 1903. It is a part of a translation specially made for the HORSELESS AGE, and protected by copyright. What appears in the *Automobile Magazine* under the above title is, therefore, stolen from our columns, and we defy that publication to produce "Professor Jules Demorest."

The *Motor World*, of this city, has also been pillaging our columns for some time past. An article headed "Autos for Chinese Royalty," appearing on page 734 of the August 11 issue of that publication, was produced without credit from the HORSELESS AGE of June 1 last, with the exception of the introductory paragraph. An article, "Motoring in the Tropics," in the *Motor World* of September 22 last, page 950, was copied, with the exception of the first two paragraphs, from the HORSELESS AGE for November 25, 1903.

These different examples will suffice, but do not by any means exhaust the instances where undue liberties have been taken by competing publications with matter specially prepared for our columns. We wish it distinctly understood that not only the title, but the entire contents of each issue of the HORSELESS AGE are protected by copyright. We are advised by eminent legal authority that our copyright is valid and can be enforced at law and we hereby give public notice that we will allow no further infringement of our rights.

Influence of Automobile Developement on Rail Cars.

The economic possibilities of internal combustion motors appealed strongly to street railway men at an early period in gas engine development, but the great weight and vibration, together with the lack of control of the early gas engines, were serious obstacles to their adoption for this purpose. Cars driven by a single cylinder gas engine, fed from tanks containing illuminating gas under pressure, were put in service in Dessau, Germany, in 1894, and similar experiments were made in Bermondsy, England, and in Chicago, but all these lines finally succumbed before the triumphant progress of the "ubiquitous trolley," and at present there are no street cars operated by internal combustion motors anywhere. The failures of these early attempts are easily explained. The engines weighed over 100 lbs. per horse power, and required flywheels equal in diameter to the width of the car; their noise and vibration were great objections to their use, and, besides, the problem of efficient cooling presented difficulties, and it was necessary to carry a great quantity of water.

Improvements made in gasoline engine

construction in recent years by automobile designers have made it possible to build engines of a size suitable for car propulsion, to weigh not over 15 lbs. per horse power, and entirely free from objectionable noise and vibration. Such engines would be of the multiple cylinder type and can be made remarkably compact, and efficient in fuel consumption. Advances made in the construction of radiators in recent years render the cooling problem comparatively easy.

It is, of course, not to be presumed that gasoline motor power would offer any advantage over electric power in urban districts, as where a large number of cars are to be operated in a limited territory, the advantage of a central power plant with large units overshadows by far the disadvantages of a distributing system. But in outlying districts, or between towns, where the volume of traffic is small, the self-contained gasoline motor car undoubtedly offers many advantages, as it dispenses with the necessity of overhead construction and of a central power station

It is to be presumed that electric transmission will be employed in cars in which the power is furnished by a gasoline motor. The electric street railway motor and its controller have been brought to a high state of perfection, and by adopting these, the need of experimenting with mechanical variable and reversible transmission devices would be obviated, and the gasoline engine and generator could be located where they are perfectly accessible and protected from dirt and moisture. The ordinary trolley car would seem to lend itself very well for transformation into a self-propelling car, by partitioning off part of the car body in front to receive a power generating plant consisting of a four or six cylinder engine direct-connected to a generator. The same controller as on trolley cars can evidently be used, and little difficulty would be met in finding suitable locations for the accessories of the engine—radiator, muffler, gasoline tank and carburetor.

The Wolseley Co., of England, have recently equipped a number of cars for an English line with such power generating plants, and have also secured an order for several engines for this purpose from the General Electric Co. in this country. Engines of the power required for street cars are not built for automobile purposes, but the experience gained in building four cylinder automobile engines of 20 to 30 h. p. *enables a manufacturer* to build the larger engines without trouble. We have no doubt that there will be quite a demand in the near future for large multi-cylinder engines for this purpose and hope to see automobile manufacturers secure their share of the orders.

Sobriety Essential in Auto Drivers.

A good deal of discussion has been going on of late regarding the possibilities of an automobile in charge of a drunken driver, particularly in city streets. The dangers to the public are obvious, much greater than those presented by horse vehicles with drunken drivers. A drunken horse driver is generally an object of terror to other road users, but fortunately, as a rule, he drives a sober horse, which, provided it is not too young and skittish, can usually be trusted to get home in safety. The concern of the public regarding the dangers of automobiles in charge of topers is, therefore, not difficult to explain, but we believe the history of automobilism furnishes little cause for anxiety in this respect. We do not at the present recall a single case in this country of an automobile driver being arrested and prosecuted for drunkenness, although reports of several such cases have come to us from England. We have before us a report of a recent case of this kind in London, when Justice Shiel, of the Westminster Court, sentenced a man to one month's hard labor for driving an automobile onto a sidewalk in Lambeth Palace Road while under the influence of liquor. In connection with this sentence the judge announced that "regardless of position, he would send any one to prison who was proved to have been drunk while driving an automobile." The report was sent us by an American subscriber abroad, with the remark that it was a good decision, and we can only subscribe to his view.

This matter has also been under consideration in Kansas City, and we learn that it is proposed there to exact "a pledge of sobriety and thorough competency" from all applicants for drivers' licenses. It is not quite clear what is meant by a pledge of thorough competency, but there is no doubt as to what is meant by a pledge of sobriety. We do not believe there is any cause for introducing such a feature in automobile legislation. The history of the movement certainly does not justify it, and it is extremely doubtful whether any practical results would follow. The average automobile driver is intelligent enough and possesses sufficient self-control to make the attempt to restrain him by pledges superfluous; and in case drivers addicted to drink should succeed in gaining charge of cars, they would not be kept sober by pledges.

As a matter of fact, the hired drivers who indulge in liquor too freely are not likely to keep their positions very long, nor, indeed, to obtain positions. The owner of a car, being in most cases held responsible for any damage that may be done with it, has every reason to assure himself that it is operated by a sober and reliable man. Nobody of authority or in any way interested would allow a drunken man to start out with a car, and about the only possibility of the streets being endangered in this way is that a driver might get drunk while on a trip alone, or—a party of occupants might get drunk—both somewhat unusual cases.

It has often been said that it is impossible to keep a man sober by legislation or by exacting pledges from him, and the danger of drunken auto drivers must therefore be guarded against by other measures. The financial interests involved will have a strong tendency to eliminate the drunken driver, but in view of the menace to public safety, heavy penalties will be imposed on the offense of driving a car when under the influence of liquor.

Drop-Forged Axles.

There is certainly no doubt of the superiority of the drop-forged I-section form of front and stationary rear axle, as compared with tubular axles with ends brazed or clamped on, and we are glad to note that this type of axle is being adopted by a number of American manufacturers. It is certain to predominate in the future, as are forged I-section parts generally wherever bending stresses must be sustained in automobile construction. There is apparently only one obstacle to the manufacture of standard front and rear axles by drop forging manufacturers, and that is the varying distance between springs. If this could be standardized, through the efforts of the proposed engineers' auxiliary of the Licensed Association, it would open up possibilities for a new departure in axle manufacture. The drop forged front axle with integral axle ends is superior to present constructions, because of its reduced weight, greater safety (being without joints), and because it requires less machining. If made in large quantities it would undoubtely be the

expensive axle to build. The diffi- at present is with the location of the g blocks, as their proper distance from enter varies according to the width of rame. It would, of course, be possible cate the spring blocks far enough from enter to meet the requirements of the st frames, and on narrower frames the spring horns and brackets out the frame to bring their forked ends the ends of the springs. There would advantage in this arrangement in that strains on the axle due to the weight ed by the springs is less the farther atter are away from the center of the ; but, on the other hand, if the springs oo far out, they limit the angle through h the steering wheels can be turned, by making the car unwieldy. This con- ation does not apply in the case of axles, and there is no reason why the gs should not be placed out as far as ble without interfering with the drive is. It is generally known that moving prings out from the body sideways in- es the stability of the car, a consider- of particular importance in connection top-heavy closed cars (limousines, buses, etc.).

the proper parties took up the subject, lo not believe any difficulty would be in standardizing frame widths, and it d then be a matter for drop forging facturers to get out suitable axle de- . It may be noted in this connection the French Automobile Manufacturers' ciation standardized frame dimensions al years ago.

The Fatal Cup.

e Vanderbilt Cup race, which was run ong Island last Saturday, proved the liest event of the kind since the ill- Paris-Madrid, a year and a half ago, responsible for two, possibly three, is, and a number of minor accidents. first fatality in connection with it oc- d on Monday of the race week, the anic of one of the cars entered being cted and fatally injured during a trial over the course. During the race it- one of the men who started in hopeful ts during the early morning hours had hed his last before the winner had ed the finish line, and another at this ng is hovering between life and death e hospital, suffering from concussion e brain. It seems, therefore, that the expectations and fears of those who have kept track of automobile races during recent years, as well as of the contestants themselves, have been fully realized.

The whole race from beginning to end was simply a chain of accidents, and those who attended it for the sake of excitement must have had their fill of it. A writer in one of the New York dailies says that when the report of the first serious accident reached the grand stand the occupants lost practically all interest in the relative positions of the contestants and in the speed made, and waited only for reports of further accidents, expecting to see them occur before their very eyes.

Previous to the race the organizers gave out a statement that every precaution would be taken to ensure the safety of the course, yet in spite of this the race ended fatally, proving that such precautions avail but little. To talk of such a mad dash as in any sense a scientific test, as its promoters did in their answer to the application for an injunction to prevent the holding of the race, is arrant nonsense. No opportunity is afforded for scientific study when the wave of excitement runs so high as it does during these events, with the exception of the opportunity for observation afforded the surgeons who attended the maimed and injured drivers.

For the second time local authorities in New York State have given their sanction to a speed contest over the public highways, and each time it has cost three human lives. That a State marching in the forefront of civilization should sanction such barbarous exhibitions, of no earthly use except to satisfy the morbid cravings for excitement of a few gamblers and idlers, is an open scandal. Its lawless and brutal features aside, however, the Vanderbilt race has probably served one good object, viz.: it has shown that the present State automobile law which empowers county authorities to lend the public roads for automobile races is altogether wrong. A test of the law, we believe, would reveal its unconstitutionality, but it is likely that the whole law will be replaced early next winter by more desirable legislation.

A Remedy For Burns.

A saturated solution of Epsom salts is an excellent remedy for burns. Apply as soon as possible, and keep wet constantly until pain ceases.

The Stimulus of Competition.

By Albert L. Clough.

The development of the gasoline and of the steam automobile, which have taken place simultaneously, side by side, during the last few years, have not been without important effects one upon the other. Not every one realizes how important a requisite in the advance of any art is a sharp competetition between diverse methods of solution. Just as in the world of politics, the existence of at least two parties of radically different views seems necessary to hold political abuses in check and bring out the best in the theories of each, exactly so in the mechanical world, if the best rate of progress is to be made, at least two radically different solutions of the problem in question should be offered to the public and subjected to its searching criticism, and to such appreciation as they may merit.

The result is that the points of special experiment possessed by one solution are constantly held out as superior features not possessed by the other, and the most earnest efforts result upon the part of the promoters of the system criticised, to embody the good points of the system which possesses the superiority in question. Quite unintentionally the detractors of one system are conferring a great service upon the exploiters of the other, by making them acutely conscious of their shortcomings and spurring them to an energetic effort toward their removal—and vice versa.

REDUCTION OF NOISE AND VIBRATION.

Throughout the history of development of the two motive powers the steam machine has constantly been held up to the buying public as a model of quiet and vibrationless running, and the gasoline car has been pointed to as an example of superior fuel economy, wide radius of action and ever-readiness. These claims were all, in great measure, based upon fact; were realized as just criticisms by the promoters of the two motive powers against whom they were directed, and proved the incentives to important reforms in both classes of vehicles.

The remarkably quiet running of steam vehicle engines has unquestionably given a great impetus to the present high development of gasoline engine mufflers, to improved valve gears and to better methods of balancing of the reciprocating parts, and it has undoubtedly had its effect in the general adoption of more gearless drives upon gasoline cars. The freedom of vibration which is a feature of the steam engine has probably acted as a stimulus to the adoption of balanced single cylinder gasoline motors and of the multicylinder types which have so perfectly minimized this objection. If it had not been for steam competition, it is probable that the gasoline vehicle motor of to-day would have been publicly accepted in a much noisier and more pulsating form than it

exists to-day. The frequent claim of gasoline car manufacturers that their product "operates as smoothly as a steam vehicle" bears implicit testimony to the truth of this statement. A wide range of speed control by means of the throttle was early pointed out as a valuable feature of the steam car, and its general recognition as an advantage has not been without effect in leading to the attainment of an increased range of speed and torque control in gasoline engines, which of late has reached a point of great refinement through improvements in carburetor construction and throttle and spark shifting mechanism.

NECESSITY OF CHANGE SPEED GEAR.

Freedom from the necessity of using a change speed gear of somewhat complicated character and difficult manipulation has been considered at least as a superficial point of superiority of the steam car, and this belief upon the part of the public must have had its effect in causing a simplification of speed changing gears of gasoline machines, and especially an improvement in the celerity, smoothness and convenience with which these gears could be manipulated. Without the stringent criticism of their steam competitors in this regard, it is hardly to be believed that the manufacturers of gasoline machines would have been moved to the enormous expenditures in experiments and to the vast improvements in material and workmanship which have resulted in and now characterize recent speed changing devices.

Indeed, so far has this simplification in control of gasoline cars progressed that a vehicle of this class is now in operation which possesses as controlling devices merely a steering wheel, throttle, reverse pedal and brake—exactly the controlling devices which are necessary upon a steam car.

IMPROVEMENTS IN IGNITION.

The frequent criticism of the electric ignition system as a necessary but delicate and uncertain adjunct of the gasoline engine, has always been urged by the devotees of the steam system, and for a long time proved a vulnerable point of attack in the position of the gasoline promoters. The most earnest and painstaking attention has been devoted by gasoline car manufacturers to this point, partly, no doubt, on account of the very severe structures arising from their competitors, and the improvement of this part of the equipment has been little less than astonishing.

THE OTHER SIDE.

Looking at the matter from the other side—the effects of superiority of gasoline practice upon the steam vehicle art—similar conditions may be noted.

The steam boiler with its dangerous feature, apparently inherent in the storage of a large amount of thermal energy under high pressure, and the loss of time in starting, inseparable to the process of imparting the thermal energy to a considerable bulk of water, has been a point of general comment and disparagement upon the part of the gasoline fraternity, who call attention to the freedom of their system from explosive dangers, and to the fact that its motive power may be instantly started into full activity. That the flash boiler, with its practical freedom from the dangers of energy storage and its almost instantaneous steaming qualities, is, to a certain extent, the direct answer to this criticism, may reasonably be believed. In fact, the flash boiler is curiously similar to a carburetor, in that it furnishes its expansible vapor practically as the motor calls for it, and without any material reserve supply.

INCREASE OF MILEAGE.

A much greater mileage upon a given quantity of fuel has always been a claim of superiority truthfully made by the devotees of the gasoline system, and the use of a permanent or very infrequently renewed supply of water, has been a further point claimed by the gasoline interests as a decided advantage over the large water consumption of steam vehicles. The employment of steam vehicle motors of the compound type, operated by exceedingly high pressure steam containing a large percentage of superheat and exhausting into air-cooled condensers, is a development which might not have eventuated so soon or gone so far as is now the case had the superiority of the competing gasoline system in the above respects not been so marked.

GREATER RANGE OF TORQUE.

The great advantage of the enormous range of torque and speed relations possessed by the gasoline car in its gear changes has not, until very lately, been recognized by builders of steam vehicles, but that it has at last become apparent is evident in the design of steam trucks and in the forthcoming design of one of the leading touring cars. This car will possess a "low gear" in addition to the regular direct drive, which, besides securing for it enormous driving wheel torque under difficult conditions, will give it plenty of water pumping capacity at all times. Gearlessness will thus no longer be a feature inseparable from steam cars.

Of the close outward resemblance which has been given to many steam cars in imitation of accepted gasoline designs, little need be said, but attention may be called to the adoption of the "engine in front" type in the construction of a well-known steam touring car, which can hardly be attributed to any other cause than the example of prevailing gasoline models. The chief result of this mutual modification of the two systems, one by the other, is to cause them to become less different, not only in superficial respects, but in the more important considerations of performance. The best of which it is capable is infallibly secured from each motive power in the process.

LIMITATIONS OF SYSTEMS.

Of course, each system must have inherent limitations imposed by natural law which no amount of ingenuity or inventive subterfuge can ever hope to break through. Those limitations will forever restrict the development of each of the two systems in certain particular directions. For instance, if the natural law is such that the work cycle of expanding air heated in a working cylinder is of greater efficiency than the work cycle of water vapor externally heated and admitted to the working cylinder, and this is true in the most general case, then the internal combustion system, in respect to fuel economy, must inevitably possess a lead over the steam system which it is possible to largely minimize, but never entirely to overcome.

The possession of some such natural advantage by one system or the other is very likely, other things being nearly equal, to give it precedence in fields where this special feature of merit is of determining importance, and the possession by one or the other of a large balance of natural advantages which ingenuity is powerless to controvert is the condition of the final precedence of this favored system over the other.

Quality of the Ignition Spark.

By Frank N. Blake.

Considerable—but none too much—has been written from time to time on the importance of having the explosive mixture in the cylinder of an automobile fired by a good spark instead of a poor one. The reason why the spark should be a good big one is sometimes explained by saying that having a larger area of surface more gas can come in contact with and become ignited by it in a given length of time, so that the explosion takes place sooner and exerts its force on the piston at a more opportune time. If this was the correct and complete explanation it is evident that by slightly advancing the spark the mixture would ignite enough sooner to equal the explosion produced by a bigger but later spark. That this is not the correct explanation is evident to those who have tried to make it work.

Why the large spark is needed in order to obtain the best results is not for me to explain, but I can confidently assert that it is not sufficient to use a spark that will merely explode every charge—it must be a good spark or the mixture will not explode with its maximum force. It may be hard for the beginner to believe that sparks of such size and quality as will invariably ignite every charge are not all that is needed, and even some who are not in the beginner's class may find it hard to believe and impossible to account for the fact that a spark should do something more than to simply ignite the explosive mixture.

A mixture of gasoline vapor and air is by no means the only explosive which must be properly fired in order to produce the most violent explosion; I have never seen it demonstrated, but have been told that dynamite, if ignited by a flame, will burn freely, but without an explosion. In Prof. George M. Mowbray's book, "Tri-Nitroglycerin," the idea is repeatedly advanced that nitroglycerine and other explosives must be ignited in the proper manner in order to obtain the best results. In reference to the slow progress made at one time in cutting the Hoosac Tunnel, he says: "A very light initial exploder was used, neither suited to the explosive used nor capable of developing, perfectly and completely, the force stored up in nitroglycerine, the impression of the blasters being that if an explosion followed the electric spark, then the explosive must have developed its full force—an expensive error for the contractors."

In other places he writes: "The so-termed giant powder was found to be of 'no account' until an initial violent explosion of nitroglycerine was used with it, to start out its force. This is true economy, and is confirmed by every scientific writer who has experimented on the subject."

"Loose guncotton, if gently set on fire by a spark, smoulders slowly away, but burns rapidly if lit by a flame. A charge of guncotton in blasting a mine or in a rifle explodes after the manner of gunpowder; but if fired by a suitable charge of fulminate of mercury it 'goes off' with terrific violence."

"Our French neighbors have a clearness of description in these matters that I avail myself of. Messrs Roux and Sarrau describe two kinds of explosions that are capable of being effected with nitroglycerine. One they designate as 'an explosion of the first order.' This is such an explosion as is produced by the detonation of a heavy charge of fulminate in the nitroglycerine; it then yields a force equal to ten times that of gunpowder. But if it be lighted, it may then explode with a force equal to twice that of gunpowder only; this is called 'an explosion of the second order.'"

Thus it appears from the writings of an eminent authority that giant powder, guncotton and nitroglycerine must each be not only exploded, but exploded by the right method in order to do the most effective work, and if the explosives named exert different degrees of force, depending on the quality of the ignition, it does not seem improbable or unreasonable that a mixture of gasoline vapor and air should do the same.

Whether this appears reasonable or not is of less importance than the fact that it does need a good spark to do good work in an automobile; this any one can verify for himself by starting the motor with the weakest battery that will explode every charge and then switching in a good strong battery and noting how the motor immediately speeds up. And if this is not convincing, let the experimenter attempt to go up a hard hill with a weak battery. One that will run the engine nicely while running idle will fail ignominiously when put to hard work. I learned one night by a bit of heartfelt experience that a nearly exhausted battery would not run an automobile up a bad hill, and the lesson will never be forgotten. The motor would run, but very little power was developed, and when the throttle was opened the motor would stop. As the spark looked good outside the cylinder, I concluded that the carburetor was partially clogged, so that the engine got too little gasoline to develop much power when running with the ordinary supply of air, and too little to run at all when the air supply was increased by opening the throttle. The true explanation was that the larger charge increased the compression so much that the weak spark could not jump between the spark plug points.

It does not pay to use batteries after they begin to get weak; it is less expensive and far more satisfactory to replace them with new ones than to buy the extra gasoline that is used to in some degree compensate for poor ignition.

Electric Vehicles Salable the Year Round.

Owing to the lack of radical changes in the construction of electric vehicles, they are more salable all the year round, and while the probable purchasers of gasoline cars are waiting for next year's models, the wise agent is selling a few electrics.

TOURING ROUTES

A White Mountain Tour.

By L. E. French.

(Continued.)

The next morning we left the Mt. Adams House and continued on through Bethlehem, passing the Twin Mountain House.

When within several miles of the Profile House, we climbed the famous three-mile hill, on which it was necessary to stop once or twice to allow the water to cool. Upon arriving at the summit, however, one has entered the most interesting region of the mountains. Echo Lake, The Profile, The Old Man of the Mountains, The Pool and the Flume, all follow one another in close succession.

The Profile presents an imposing sight, especially when approached from the north, when one suddenly finds oneself in a great natural basin with almost perpendicular walls rising on every side. After an excellent dinner at the Profile House, we journeyed on, stopping to see The Old Man of the Mountains and The Pool, but leaving the Flume for the return trip.

I have an aunt living several miles from West Campton, and, having planned to make her a visit, we continued on to the latter place. There we inquired the way of an elderly gentleman, who gave us explicit directions and added as we left: "You'll think you're climbing Mt. Washington before you get there, but I guess that auto will make it." The old gentleman certainly

Setting Out for the Day's Run.

knew what he was talking about, for we had to ascend Bald Hill, which was two miles in length and was very steep, having an elevation of thirteen hundred feet. We had no difficulty, however, until within a short distance of our destination, when a fearful grade loomed up ahead. We tackled this fearlessly, but when half-way up the engine stopped dead. By blocking up the wheels, speeding up the motor and then jamming on the low gear, we were able to move just four feet. By repeating this process for half an hour, we finally reached the top.

The news of our arrival spread like wildfire, and we soon learned that we had the honor of being the first automobilists to bring a machine into this locality.

"So you climbed Grave Yard Hill, did you?" everyone inquired in astonishment. Grave Yard Hill! It was certainly well named, for there was a cemetery directly at the top, waiting to receive less fortunate tourists than ourselves. We measured the grade the next day and found that it averaged 30 per cent, the minimum being 20 and the maximum 40 per cent.

After spending one day on Bald Hill, we ran down to Plymouth for gasoline and then retraced our tracks as far as Bethlehem, stopping on the way to explore the Flume.

For the benefit of future tourists let me state that the horses and their drivers between Plymouth and the Profile House are as bad as any in the mountains. One comical incident occurred in this locality. We were slowly ascending a steep and heavily wooded hill when far ahead in the road we discerned several persons evidently in a state of great excitement. Soon we discovered that they were gesticulating wildly, and faintly audible cries reached our ears. We did not know just what it all meant, but as the water was rather hot we stopped for a few moments to cool it off. This seemed to satisfy the persons in the road, who soon disappeared. After waiting some time we were about to start on when the same persons reappeared and began a more passive form of exercise. As soon as we started, they disappeared again. Before long we came upon two ladies, peacefully seated upon a stone wall.

"Our horse was a little afraid," they explained, "so we wanted you to wait while we got him out of danger." They had certainly done well, for there was not a sign of a horse in sight, and this was the more remarkable when we noticed that on one side of the road was an abrupt bank and on the other a rocky hillside with a woods half-way down the slope. The horse must certainly have gone down in those woods or have gone up in smoke.

But to continue the narrative. From Bethlehem we were to return to Conway via the Crawford Notch. At four o'clock in the afternoon we pulled up before the magnificent Fabyan House, to make inquiries about gasoline. The long porch

A Typical Scene.

The Pool.

was lined with people whose attention we had evidently attracted by our grand entrance onto the scene. As we threw on the clutch preparatory to leaving, the engine suddenly began to race, and someone sang out, "Your chain's broken." Instantly there was a tremendous scraping of chairs on the long porch. We were surrounded almost before we could get out of the machine, and realizing that it was to be an exhibition repair, we took off our coats and went at it with a will. A chorus of surprised exclamations burst forth as we unrolled the tool kit and producing some new links, fitted them quickly into place. Some of the remarks were amusing.

By George, they know how to do it all right!" someone cried. "I guess they've been there before."

"Look how quick they get their hands dirty, though," someone else replied. "I shouldn't like that job." Mr. Gaylord smilingly produced a cake of hand sapolio and said:

"Here's something that will take the dirt off all right."

"There, exclaimed the first speaker. "These fellows have the whole outfit with them. They're right onto the job."

"They ought to have a cushion to lie on when they get under the car," said the second man.

"We have cushions right here," said Mr. Gaylord, as he removed one from the seat and placed it under the machine.

"What did I tell you," cried the first speaker delightedly. "They've got the whole thing."

About this time the repair was completed, and we packed up the tools, jumped into the car, and left the inquisitive crowd gaping after a cloud of dust. Shortly after this we passed through the Crawford Notch, with its wonderful scenic effects,

The Flume.

Flume Falls.

and we thanked our stars that we had shown the good sense to go down the hill instead of up, for it was certainly a chain-splitter. After running a few miles farther, the darkness came on quite rapidly and it was intensified by the dense woods through which we were passing, so we stopped at a brook to load up a generator.

Here we made the alarming discovery that we had just one match. To run through those woods in the dark would be impossible, yet we disliked the idea of spending the night where we were. The darkness seemed to be shutting us in, and a deathlike silence was now and then broken by the noise of some animal crackling through the bushes. Soon the critical moment arrived, there was an instant of suspense, and then the road was flooded with light. That ride through the dark will never be forgotten. The road was literally a tunnel through the woods, and the circular light from the lanterns increased this effect. We seemed to be traveling through a kind of subway. Finally we reached Bartlett and put up there for the night, reaching Conway the next morning.

Shortly after this we started for home via Portland and the coast. The road between Conway and Portland cannot be recommended to automobilists, as it is nothing but a terribly sandy waste or rather a terrible waste of sand. During this run the engine showed a tendency to start very hard, although it worked well when once in motion. Sometimes after cranking for fifteen minutes, we would push the machine to a hill, and coasting down would throw on the clutch near the bottom and thus start the engine.

One of the sight feeds in the lubricator became clogged and we got a hot-box in the crank bearing which necessitated a stop. After cleaning out the oiler and cooling the heated parts, we improved the opportunity by taking out a shim from each connecting rod. While we were working on the machine, an old farmer came sauntering down the road.

"Air you fellers comin' along purty sune?" he drawled.

"In about ten minutes," I replied.

"Wall, that's all right," he continued. "I jes' ast caws my boy Jim he's holdin' the hosses outen the woods down thar a spell. We was a-comin' along with a load er hay an' a feller come by an' says you was down here with one of them oughter-mow-beeles, so we jes' unhitched the hosses, an', says I, 'Jim, you jes' take these er hosses down inter the woods an' wait till that thar oughter-mow-beele gets by.'" Having delivered himself of this speech, the old gentleman ejected a large squirt of tobacco juice and sauntered over to have a look at the machine. Just as we were preparing to start he spoke again.

"Wall now, that there's quite a riggin', ain't it!" he ejaculated. "There's just one thing about them contrapshions thet I never could understand."

"What's that?" I inquired. He turned the quid of tobacco over in his mouth as he gazed reflectively at the machine before answering.

"Wall," he said at length, "I never could quite make out what made 'em go without a hoss." At this we laughed, but not wishing to hurt his feelings, we invited him to jump in and ride down to his hay cart, which he did with alacrity.

It was getting dark when we reached Westbrook Junction. Just at this time the machine stopped for lack of gasoline, but we did not have to go far to get some. By the time we had filled the tank and lighted the lamps, quite a crowd had collected. Then we tried to start the engine, which uttered feeble grunts of protest as Mr. Gaylord and I took turns at the handle. We cranked with the relief cocks open and with the cocks closed; we primed the carburetor and varied the mixture, all to no purpose. With the cocks open there was a slight explosion in the forward cylinder each time, but the rear cylinder seemed dormant, so we put in a new spark plug and tested up the batteries, which were all right. I thought that the trouble was in the mixture, possibly water in the gasoline pipe, so we removed the plug in the pipe below the carburetor and allowed a quantity of gasoline to run out. All this availed nothing, although we had consumed more than an hour. The crowd meanwhile had been steadily increasing until it completely surrounded us. Someone had kindly brought us a lantern and everyone present seemed much interested in the proceeding. One man, indeed, was too much interested. We had the back cover off and he came up and peered in to see what made the wheels go round. Just then I happened to get an explosion in that cylinder and the half-burnt gas, discharging through the relief cock, struck him squarely in the face. With a fearful bellow he staggered towards the sidewalk, clamping his nose with one hand and fanning the air with the other, while the crowd fairly howled with laughter.

After we had been trying for an hour and a half to get the engine started, the prospect began to be discouraging.

Finally, I had an idea.

"If a few of the gentlemen present will be so kind as to assist us a little," I said, "we will soon have the machine running." The result was reassuring. Cries of "We're with you, old man," "Just call on us," "Tell us what to do," came from every side. There was a slight grade ahead, so that it was easier running backward than forward.

"Just take hold and push her back," I said. Instantly dozens of eager hands took hold and we were soon humping back over the road. Then we threw on the reverse and the engine started as easily as the day it left the factory. We backed smoothly away from the crowd like a steamboat from the dock, and then, bringing the machine to a standstill, started it forward. By this time the crowd was cheering lustily and we bowed and shouted our thanks as we passed through. Soon after this we reached Portland, where we spent the night.

A Wayside Adjustment.

Summit House on Mt. Kearsarge.

The remainder of our trip was comparatively uneventful. Business matters were pressing at home, so we did not linger by the way, and although it rained all the next day, we made one hundred and forty miles. We had no trouble with the machine during this run.

Considered as a whole, the trip was a very successful one. The machine was not a touring car and yet it stood up remarkably well under the severe mountain usage. Our troubles may be summed up as follows: Three chain breaks, two punctures, stripped two gears, trouble in starting.

We found out later that this trouble in starting was due entirely to an obstruction in the gasoline pipe, which jiggled around when the car was in motion, so as to allow the gasoline to flow but closed the pipe when the machine was stationary. Usually there was enough gasoline left in the carburetor to start on. When we opened the plug in the gasoline pipe, the gasoline flowed down from the carburetor, and we supposed that it was coming up through the pipe.

Richmond, Indiana, to Detroit and Return.

By S——.

The various routes to St. Louis have claimed the larger part of our attention this summer, and on these no finer stretch is to be found than the 200 miles from Indianapolis through Richmond to Columbus. To autoists living in this part of the country and south of here, travel northward is the natural thing in the summer. One car, a two-cylinder surrey, made the trip to Niles, Mich., by way of Logansport and South Bend. A more easterly route on the return avoided heavy sand. Three machines made the run to Toledo, two continued to Detroit, and ours to Mt. Clemens.

There are two routes to Toledo. One is by way of Greenville and Piqua, Ohio, where the road described by Dr. Ensey in the Horseless Age of September 14 and 21 is taken. The other way, shown in the sketch, leads north through Lynn, Winchester, Portland, Decatur, Ft. Wayne; then east by way of Defiance and Wauseon to Toledo. The river road from Defiance to Napoleon and Toledo is very pretty, but sandy after leaving Grand Rapids. From here one may profitably go north three miles to a stone road which leads through Waterville and Miami to Toledo.

From Richmond to Portland, 46 miles, the road is principally graveled, with a few miles of fast stone road and only a mile or two of dirt. From Portland to Ft. Wayne, 50 miles, there is stone road most of the way, the first ten miles of which is very fine, succeeded by patches of loose stone which are very hard on tires. The clay track alongside is fair in dry weather but impassable in wet.

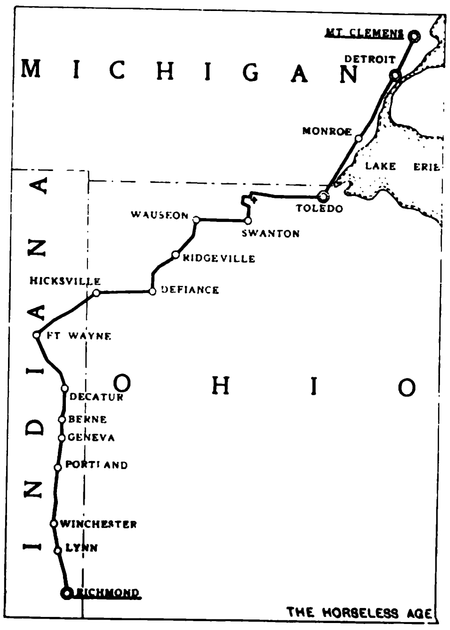
From Ft. Wayne to Hicksville, 18 miles, and from there to Defiance, Ohio, 21 miles, the road is piked or stone, and very fast. *The best road to Toledo, some 55 miles, is* by the ridge road to one mile west of Wauseon, thence east to Swanton, then north to a brick Catholic church and cemetery, and then 18 miles east into Toledo. The last 40 miles is fine stone road.

The going is fair until one reaches a point about a mile south of Monroe, where in dry weather there will be ten miles of low speed work unless one crosses the Raisin river at Monroe and follows it across three railroad tracks, then turning north. We are now on the road which Dr. Ensey missed, and which proved a very expensive miss. A Richmond party with a two-cylinder car, traveled that same sand road when it was mud, on the low speed from Monroe to Detroit, arriving some time the next day. The shore road, while a country highway, takes one where the refreshing breezes of Lake Erie blow. A somewhat difficult ford was negotiated where much heavier cars had stalled. A bridge is now in which obviates the difficulty. This road leads into Trenton, and from there one follows the street car track to the City Hall of Detroit—about 64 miles from Toledo. From there to Mount Clemens is an old national toll road in fine condition.

EXPERIENCES.

The most extraordinary experience other than head end collision with dogs and chickens was with two horses ridden by one man. It was an impromptu circus act.

The man was coming up the road on the back of a very large yellow animal, leading a colt by a long halter strap. I stopped on the proper side, as the colt began to reel up on the other one's neck as a windlass. Instead of unraveling himself, the Dutchman idiotically backed the bunch down a five-foot bank into a new railway cut on my side of the road. The whole posse turned a back somersault with the yokel on the bottom. The colt jumped up and galloped away. The big yellow animal scraped up a cloud of dust and himself and waltzed down the road. I supposed that the foreign population was reduced by one and that a coroner and a hearse were needed, but out of the ashes—phœnix like—rose the Dutchman, and he swore. He was drunk, or he would have been dead. The horses stopped and waited for him to carry the saddle awhile, and see how he liked it.



A clay road made "greasy" by rain is a vain thing for safety. When about five miles north of Defiance, one car slewed, jumped the ditch, took out two panels of fence and the front axle.

My own troubles consisted in the failure of the link by which the low speed is thrown in, but we were able to start from rest on the high speed and so navigated the level country into Defiance, where a repair was quickly made.

Another driver alone in a popular ten horse-power car made the 225 miles from Toledo to Richmond between 5 A. M. and 10 P. M. I made the return from Detroit to Richmond, 300 miles, in two days of ten hours each, the first four miles being through heavy clay on the low speed.

TIRE TROUBLES.

From an experience covering two seasons and 5,000 miles, principally over good roads, in a medium weight runabout, I am compelled to say that tire troubles are the only ones, and they are a vexation. My tires are single tubes, and on the northern trip above described, a rear tire caused exercise with the hand pump about every hour, till Ft. Wayne was reached. Here a dose of soapstone and water effectually healed a blistered, defective, but new, tire. A second was cut in Detroit and replaced by the extra carried.

My friend with the double tubes had seven blow outs in as many miles and arrived in Ft. Wayne at two the next morning. A clutch can be tightened, the ignition end can be followed logically from A to Z, that is, from battery to spark plug, bearings can be tightened (if they cannot, the machine is seriously defective). In other words, the usual troubles can be run to earth in a short time, but tire troubles!!! The recent St. Louis tour offers the most severe arraignment of tires. With all the recklessness, collisions and upsets, the services of the tire men were most frequently needed. Perhaps, however, the conditions were most destructive to tires. I have never been stopped but once on the road except by tire troubles. Proper care of the machine and proper caution on the road have prevented any accidents of any kind. I have never been towed in and have never been delayed ten minutes by the engine or any other part of the mechanism.

A new motor omnibus, propelled by a four-cylinder gasoline engine and built by the Milnes-Daimler Co., of London, has recently been placed in use on the streets of the British capital by the London General Omnibus Co. The driver's seat is back of the motor and the bus carries passengers on the lower floor (none on the roof).

LESSONS of THE ROAD

My First Trip.

By Dr. F.

I had been subject to occasional attacks of automobile fever for over a year, till last fall I succumbed to a spasm of deeper intensity, and the result was that an agent for a light touring car exchanged a red creation of promising possibilities for a good sized check. I had no more of an idea of what I was in possession of than if some one had presented me with a flying machine, but the agent very kindly offered to render me every assistance necessary to become familiar with the beast, and for two days I did nothing but jeopardize the lives of my friends as well as my own, and prided myself upon thinking I had fairly well mastered the situation, while in reality I had simply learned to keep the thing in the road.

It was on Friday that I came into possession of the piece of property, and on the Sunday following I concluded I was experienced enough to take a trip by myself, and thought I would make my home, which was seventy miles distant, the objective point. How I ever got together sufficient nerve to attempt this trip alone with my limited knowledge has since then been a puzzle to me, as the road led directly over the highest points of the Green Mountains, and the country is very sparsely settled all the way. As I had some grave misgivings as to my ability to get outside the city limits without some accident I concluded to go alone, as I didn't care to have any of my friends along to contribute any satire when the occasion presented itself, and didn't care to expose my ignorance, for, to tell the truth, I didn't know a lubricator from a headlight.

Sunday morning I was so anxious to get started I was up at daybreak, filled my tanks, oiled every exposed place on the machine, even to the bonnet, and after bidding my friends a fond and affectionate farewell, they watched me start with tears in their eyes, firmly believing they would never again see me alive. I couldn't have started for a trip through the jungles of India with more misgivings or good advice than I did on my first automobile trip, but my courage was undaunted, and in spite of all the doubtful prophecies of my friends, I pushed forward over the macadam roads that lead outside the city for a few miles. I soon struck a stretch of sand that I found a trifle different than the smooth macadem, and after several attempts at making headway up grade on my high speed, was compelled to crawl along on the low gear for nearly a mile. This somehow cooled my ardor for the time being, but seemed to have the reverse effect upon my engine, which became intensely hot, and upon examination I discovered an innocent looking pipe that led from the engine into some sort of a tank beneath the car to be red hot. I didn't know an exhaust pipe from an intake pipe, but concluded there must be something wrong, and in looking around for the source of trouble I found a piece of belt hanging from a pulley, and concluded that the circulating pump had been out of commission.

While I was repairing this the engine got fairly well cooled off and I started again. I had not yet encountered any hills to speak of, but soon discovered that climbing hills was somewhat different than going down grade. The first hill of any importance I found was quite steep, and at the extreme top was a railroad track. All went well until nearly to the top, when the engine began to give up. I didn't know enough to release my clutch and let her speed up, but would keep going as far as I could and let her stop, and then crank. Just as I reached the crossing she made one of these regular stops, and to my horror around the curve, not twenty rods distant, was a passenger train coming at full speed. What passed through my mind in the next few seconds can be more easily imagined than described, but some guardian angel told me to throw my gear out and get out and push, and just as I was clear of the track by a couple of feet the train whizzed by, and I sat down under a tree and caught my breath. I wondered if such narrow escapes were everyday occurrences, and concluded before taking another trip I would take a course of nerve tonics.

The next few miles were a succession of heavy hills, crawling up as far as I could go, stopping and blocking wheels, cranking and starting again. I had learned from my agent that there was no trouble in starting my engine if I got a spark and plenty of gasoline, but how many times that day I cranked in the hot sun, with a good spark, and gasoline flooding everything in sight, and no explosion until I was covered with perspiration and my hands a mass of blisters, and all because I simply got too rich a mixture. Of course, in time I would get it reduced to the exploding point, but I would have made a good bargain with some one for a horse and buggy many times that day. How glad I was I came alone.

Finally I reached the height of land and began the descent, and found it much more agreeable than climbing. My machine is equipped with two brakes, a hand brake on the rear axle and another to the drive shaft, but for some reason the brake on the rear axle would not hold, and I had to depend on the shaft brake, which, of course, would not hold when my gears were out. I also had a device for locking the gears, that I didn't understand, and often when on the high speed the gears would slip out, and seemed to trouble me going down grade.

I soon discovered that this was a rather careless arrangement, for with the gears out I was absolutely in the hands of Providence, and had no more control of the car than I did of the mind, and came near bringing me to grief. I intended to hold my lever with one hand and steer with the other, and ordinarily got along all right, but as I was descending a quite steep hill I rounded a curve and came suddenly upon a team, and releasing my hold on the lever that held the gear and taking both hands to steer, the gear slipped out and the car shot forward, and before the team could get out of the road, and as there was no room on my side, we were badly mixed up. The force of the blow came on the front springs, which project a little, and the left forward mud guard. This was demolished entirely, but fortunately the horse was not frightened or the buggy injured. The driver was a good-natured, droll farmer, who evidently was used to making the best of everything. The first words he said were, "Well, is that the way you are in the habit of stopping?" I explained as best I could the reason for stopping, or rather for not stopping, and after getting untangled and into the road I loaded in the kindling wood from the mud guard and started on. Again I was glad I was alone.

The next incident might have been more serious than any of the others had not the same guardian angel been watching over me. I was wheeling along at a good rate, and came suddenly upon a bridge perhaps twenty feet wide, over a stream about fifteen feet below the road, but it was only by chance that I noticed that there was not a sign of a plank on the bridge, and nothing under heaven to keep me from pitching over into the stream. I happened to have control of the car, and stopped in time to prevent such an accident. There were some new planks piled up beside the road, and I concluded that they were intended for the bridge, and as I had no great desire to wait until they were placed, I began to make a way to get across. I had got one plank over when an old farmer appeared on the scene and informed me that if I disturbed any more of those planks I would be in trouble. I made pretentions of being very much alarmed, and casually learned it was a public road, and that he had taken up the planks to replace with new ones the next day, as the road was traveled but little. The nerve of some of these Vermont farmers is beyond understanding. After relieving my mind by a few well chosen words, better left to the imagination than to be accurately reproduced, I threw a few planks across—and green planks are not the lightest things in the world—and with a few parting shots at the old man, who was violently protesting all the while, I went on my way. Imagine leaving a bridge open on a public road with not even a flag up!

The roads over which I went had many

of them never before been traversed by a motor car of any kind, and made many amusing scenes such as every driver has experienced in like localities. I had just labored up a long hill with my succession of stops and starts that I had become somewhat tired of, just going over the top and down the other side, and was passing a farmhouse where curious heads were in every window, when a young fellow came rushing out and said, "Can you stop her? Can you stop her?" and not caring to take any chances of any more cranking, I passed on, remarking, "Oh, yes, I can stop her easier than I can start her."

Another amusing incident occurred as I was nearing a farm house where a horse hitched to a buggy was tied to a tree. An old Irishman and his wife came running out of the house and tried to untie the horse, the man waving his hands and shouting, "Shut her off! Shut her off!" and the woman waving her apron as though she was flagging a train and yelling at her highest pitch, "Go way wid it! Go way wid it!" Seeing the horse was not alarmed, I stopped and asked them how they expected I was going to "shut her off," and "go way wid it" at the same time, and as the horse had not even pricked up his ears, their curiosity overcame their fright, and they had a good laugh, saying they had never seen a "bile wagon," as he insisted on calling it, and had no idea what it was going to do.

The remainder of my trip was devoid of any accident worth mentioning, and was really quite enjoyable.

The last event of any importance was amusing and startling, and furnished a very fitting finale to such a day as I had spent. I had arrived home and thought I would run into the barn, which is situated at the foot of a slight grade. The big rolling door was closed, and just as I started down the grade I attempted to put on my brake, but in some way my crank, which I carried on the floor of the wagon, had got in front of the foot lever and I was unable to make any impression on the progress of the car, and all of a sudden, bang! I struck the big door full in the face and over it went, clear off the hinges, and if the sudden blow had not stopped the engine I might have been going yet. I had made up my mind I would not tell any one about anything but the pleasant parts of my trip, but this incident served to make me the aim of a great many remarks.

Since this trip I have covered something like 5,000 miles with the same car, and today it is running apparently as well as when new. I have had a good many experiences since that would be interesting, but never have I had quite as many in a single day.

Not a new automobile has appeared in Topeka for eight days. Is the craze dying out?—*Topeka (Kan.) State Journal.*

Some Experiences With a New Car.

By Everett E. Richmond.

Having been in the auto business for the last three years, it has been my luck to "run up against" some pretty queer experiences with "benzine buggies," and the series of trials with the machine of which I am going to narrate, was probably the most interesting of all my experiences. Automobiling is a sport of its own, and a seemingly interminable series of mishaps is only an incentive to the true sportsman.

The car which forms the nucleus of this narration was a four-cylinder, 20-h. p. touring car of standard make and reputation for reliability. It was a new car built on a rush order, and I was to drive it from the factory to the owner's home, a distance of 115 miles across country over some of the worst roads in New England. I had operated this make of machine before, but never under just such conditions as I was then asked to, so I was careful to go all over the car and inspect everything as far as possible, as a preventative measure against an early breakdown.

After getting all our paraphernalia stowed in the baskets and having the tanks and lamps filled, we started off fine and dandy. We bowled along through the city on the second gear at a ten-mile gait, but when we came to the open country, we threw in our high gear and opened her up, just as a preliminary test for speed. There was one thing that bothered me, however, and that was the fact that the engine answered the spark advance much better than it did the throttle. Giving the engine more gas did not seem to raise the speed in proportion to the mixture. Nevertheless, the power seemed to be sufficient on the level, so it remained to be seen how the car would act on the hills, some of which were very steep.

It was not long before we came to one, a very slight grade with a long approach. We should have been able to take it on the high gear with the momentum we had acquired from our speed on the level, but at the very first sign of a grade the engine slowed down and would have stopped had I not let her back into the second gear immediately. I had no doubt that it would climb on the second gear all right, but it still slowed down as I pushed the spark advance lever all the way down, and the immediate effect was a tremendous knocking in the engine. This was caused by exploding the charge too early on the compression stroke, and the spark lever should not have been set so such a thing could occur. She would undoubtedly have climbed the hill on the second gear, but on account of the knocking I let her back into the first gear, and then she climbed all right.

VALVE MECHANISM OUT OF ADJUSTMENT.

When we got to the top of the hill, we stopped and got out to find what the trouble was. We removed the bonnet and took off the yoke that held the inlet valves to the engine, thus releasing the valves and valve housings together. One cause for our speed on the level and our failure on the hill was immediately apparent. One valve which should have a lift of at least 3-16 in. only lifted about 1-16 in.! No wonder the throttle had so little effect. Our engine could get just enough gas to keep it running on the level, and as it drew in such a light charge, the compression amounted practically to nothing. Of course, as no power was used on the compression stroke, the engine picked up in speed, and as the load on the level was very little, it naturally ran fast. The defect was very easily remedied by giving the valves more lift, and in a few minutes we were coasting down the other side of the hill, congratulating ourselves on our discovery, and on the fact that we would climb all the rest of the hills easily. The road was deep with sand, so we had to shut down on our speed and go along on our second gear. We had a few miles of this, and then, on turning a sharp curve, we found ourselves before a veritable mountain. However, the road was good and hard, and we anticipated no trouble. We were climbing all right on our first gear when all of a sudden the engine slowed down, gave a couple of chokes and stopped. I jammed on the emergency brakes, but they failed to work, so I dropped the sprag which stopped us with a jerk, but the carriage had gained hardly any momentum, and it did no harm. After getting out and tightening the emergency brakes, we began to look for the trouble.

GASOLINE TANK TOO LOW.

We looked over and tried all the electrical connections, and found them all right, and I saw no reason why the engine would not start; so I turned the engine over a couple of turns, but there was "nothing doing." I then pressed the flushing pin on the carburetor and I noticed that the usual metallic click that indicates the return of the float to its seat was missing. I then reasoned that there was no gasoline in the carburetor, and immediately it occurred to me that the tank must be lower than the carburetor, for we were on a very steep grade and the gasoline in the tank was quite low. Once the trouble found, it was easy to remedy it, so I took off the filler plug and blew into the tank as hard as I could to get a pressure. I then put the plug in as quick as I could, without losing much air. One plug had a small hole in it, to allow air to pass into the tank, and this we plugged with a match. The air drove the gasoline into the carburetor so it flushed all right. It was then an easy matter to start the engine, but not so easy to start the car on that grade, for the clutch, which was of the flywheel type, held in by two stiff springs, would not hold; so we backed down the hill and got another start. We got about half way up the hill when the engine repeated its previous performance. The air

in the tank had evidently leaked out, and we saw that it would be impossible to keep a pressure in the tank all the way up the hill. We got out and sat down under a tree, and got our thinkers into action. All of a sudden my thoughts materialized into a scheme, and calling to my companion I aroused him and we got into the machine and backed down the hill.

WENT UP BACKWARDS.

When we got to the bottom I backed the car around and started up hill backwards on the reverse. It was slow but certain, for the tank was then higher than the carburetor and the gasoline had to flow. It was not the first time I had climbed a hill on the reverse, for only a few weeks before I had to do the same trick with a single cylinder car that was geared too high on its slow speed ahead.

At the top of the hill we turned around and coasted down the other side. As we were going down, I noticed a decided squeaking, apparently in one of the front wheels. At the bottom of the hill we stopped and found the cap on the hub of the left front wheel so hot that it scorched the hand if touched. My first thought was that the bearing had become overheated, but on taking off the cap it was found that it had been screwed so far on the hub that it rubbed against the jamb nut on the end of the shaft. We put it on again, being careful not to screw it up as far as before, and we had no farther trouble from that source.

CIRCULATION STOPPED BY WASTE.

The road now became a series of hills, and it became a case of alternate climbs and coasts with us. On one very steep hill I decided it would be better to shut down the engine while descending, and let the carriage drive the engine, in preference to using the brakes. But the engine apparently had no desire to stop exploding, for it kept right on after the spark switch was thrown out. I saw by the kick it was making that the engine was overheated, and my first thought was that the pet cock on the bottom of the radiator, which was of the cellular variety, had jarred open and allowed the water to escape unnoticed. However, on taking off the filler cap, we found the radiator nearly full of water. We saw that there must be a stoppage in the circulating system somewhere, for the pump was all right. We began to loosen the hose connections to the radiator, and at the first one we loosened we found a wad of waste stuffed in the pipe. How it ever came there is more than I know, but there it was, and it effectually solved the secret of our trouble. After allowing the engine to cool down a little, we started off again, wondering what our next trouble would be. It was very evident from the luck we were having that the car had never been subjected to a thorough road test by the company, or if it had, everything was altered in the final assembling. We were giving the car the first real road test, and it was up to us to adjust the parts as we went along.

GOVERNOR BREAKS.

I would have been happy if it had merely been a case of adjusting parts, but we soon had an accident that no operator, no matter how skilled he might be, could possibly repair on the road. We were coasting down a hill, allowing the carriage to run the engine, when suddenly there was a tearing, grinding noise that shook the car. It was all over in a second or two, but we knew that something had gone. We threw in the spark to see if the engine would run, but run it would not. We stopped and made an examination, and our spirits took an awful drop when we found the trouble. One of the governor weights in the reduction gear case had broken off, and not being able to get out, it tore the teeth out of the gears and knocked in the aluminum casing. Both gears were completely ruined, and we saw that we were stalled for sure. So, pushing the car to the side of the road, we left it and started for the village, which, according to the sign post, was three-quarters of a mile away. It proved a much longer walk, but we finally reached the village and put up at its solitary inn.

We cleaned up and then went to find a hay motor to tow us in. We were fortunate to find a kind farmer who was willing to tow us in for the modest sum of $5, and we had no alternative but to accept. We began to hope that we would not be subjected to the tender mercies of such people for any great length of time.

Before setting out to bring the car in, we sent a telegram for new gears. On the following afternoon we received them, and with the aid of the local blacksmith we got them on. At the same time I set the timer so the engine could not explode so early on the compression stroke and cause pounding when the spark lever was in its extreme position. Our whole expense for that accident amounted to about twenty-five dollars.

On the following morning we filled our tank with twenty-five cent gasoline, and left the village with gladsome hearts. We felt that we had been up against it hard, and we were anxious to reach home, which we were fast nearing. I knew that nearly all the parts needed readjusting, and my one desire was to get it into the station, pull it down, and do the work that should have been done in the assembling.

The roads were fairly good the rest of the way, and we traveled on our high speed most of the time, and just enjoyed ourselves. We were fated to have no more accidents on that trip, and that evening about seven o'clock we rolled into the station, with everything working like a watch.

The next day I took the body off the car and adjusted all the parts that needed it, and fixed things up in general. Since then that car has been run over a thousand miles, and it has never caused a minute's delay or trouble, and its owner is a happy man.

New Vehicles and Parts

The Maxwell Car.

The Maxwell-Briscoe Motor Co., of Tarrytown, N. Y., have now completed the first of each of the two types of cars which they propose to manufacture during the coming year—a touring runabout and a light touring car which are to be known as the "Maxwell," after the company's designer and superintendent, J. D. Maxwell.

The runabout model is fitted with a sheet metal body designed to carry two passengers and to provide space for carrying luggage, etc., on a platform extension in the rear. A feature out of the common is that this platform is made hollow, as it were, and provides a shallow compartment, which is accessible through a hinged trap-door, and can be used for carrying small packages or supplies. The dash is of the curved type and carries the spark coil and lubricating devices.

The main frame is of pressed steel built up in the usual manner with cross members riveted to the outer sidepieces. Semi-elliptic springs, 1¾in. wide, are fitted in front and rear, the front springs being 24in. and the rear ones 38in. long. These rest upon tubular axles of 1⅝in. and 2in. respectively, outside diameter which give a tread of 4ft. 7in. Wooden artillery type wheels are fitted, shod with 2½ in. tires. The steering wheels run on ball bearings and the rear axle on rollers.

Wheel steering is fitted, the rotary motion of the hand wheel being converted into rectilinear motion by means of a bevel pinion secured to the upright shaft which meshes with a gear sector to which an arm is attached. A movement of the steering wheel swings this arm and moves the steering wheels to correspond.

The motor is located in front of the dash beneath a bonnet. It is of the two-cylinder, horizontal opposed, water-cooled type with cranks set at 180°. The cylinders are 4in. bore by 4in. stroke, with a normal speed of 1,000 r. p. m., and the engine is rated at 8 h. p. by the makers. The cylinder heads are cast integral with the walls and the water jackets extend around the cylinder for the length of the piston-stroke and about the valve seats, but do not inclose the heads. The inner ends of the cylinders are ribbed, after the manner common in air-cooled engines.

Each piston is fitted with three eccentric rings with oblique joints which are placed at the bottom of the piston and held in position by pins. A separate groove is provided for each ring. The connecting rods are made of bronze and are of U section, the curve being on the under side. Provision is made for taking up wear in the bearings at either end. At the wrist pin end the rod is split at one side and a portion of the material is cut away so that by tightening a stud bolt which passes through both of the

8-H. P. Touring Runabout.

lips so formed, any looseness in the bearing may be taken up. The cap at the crank end is hinged on one side to the upper half of the bearing. A stud bolt on the other side passes through the cap and screws into the upper half. By turning this bolt the proper adjustment of the bearing can be secured. The crank is of exceptionally large diameter to counteract any tendency to springing, and is made of forged steel specially treated.

The valves are all mechanically operated. The exhaust and admission valves for each cylinder are located side by side, and seat in a port formed on the upper side of the cylinder head. A cap cover screws into the end of the port directly over each valve. When this is removed, the valve beneath can be easily withdrawn through the opening. The guides in which the valve stems work are long so as to assure a positive alignment of the valve at all times.

The bearings for the half-time shaft are located in a frame-like casting which fits between the top facing of the crank case proper and the cover. When this cover is removed a view can be had of the cam shaft, cams and the plungers which operate the valves, and the crank and connecting rods below. If it is desired to reach the latter group in order to make adjustments or repairs, the frame can be removed by loosening a few bolts, and with it the whole of the half-time mechanism, including the commutator for the ignition system. The crank and connecting rods are thereby exposed.

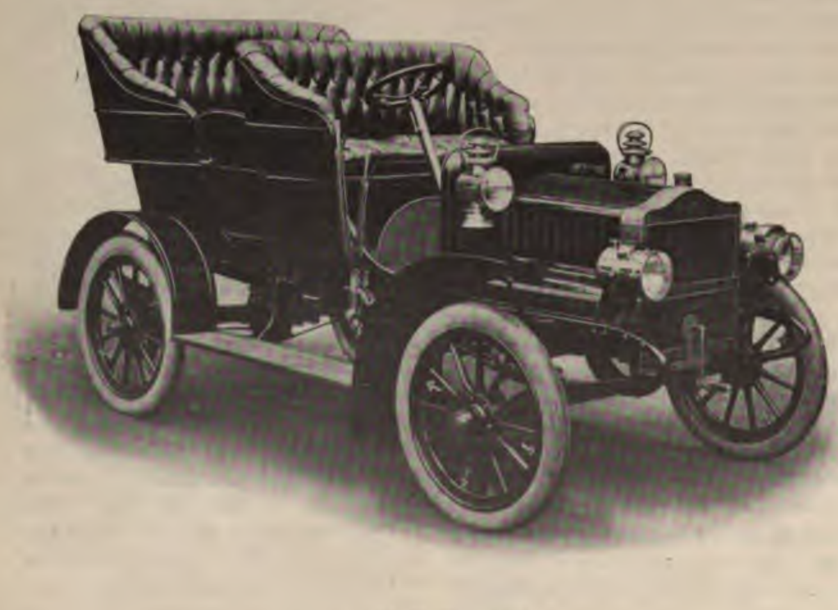
The thermo-siphon system of water circulation is employed, no pump being required. The radiator is of the honeycomb type, specially constructed to meet the requirements of the circulation system. Three gallons of water are carried, and it is said that during the test runs the system has proved to be very economical in the consumption of water.

Jump spark ignition is used, the system adopted being that employing a wipe contact at the commutator and a vibrator at the coil. The plugs screw into the top of the valve ports, and the commutator, as we have intimated, is secured to the removable frame attached to the top of the engine crank case. The cylinders are sparked in series and, therefore, but one coil is reqnired. The dry batteries which supply the necessary electrical energy are carried beneath the seat.

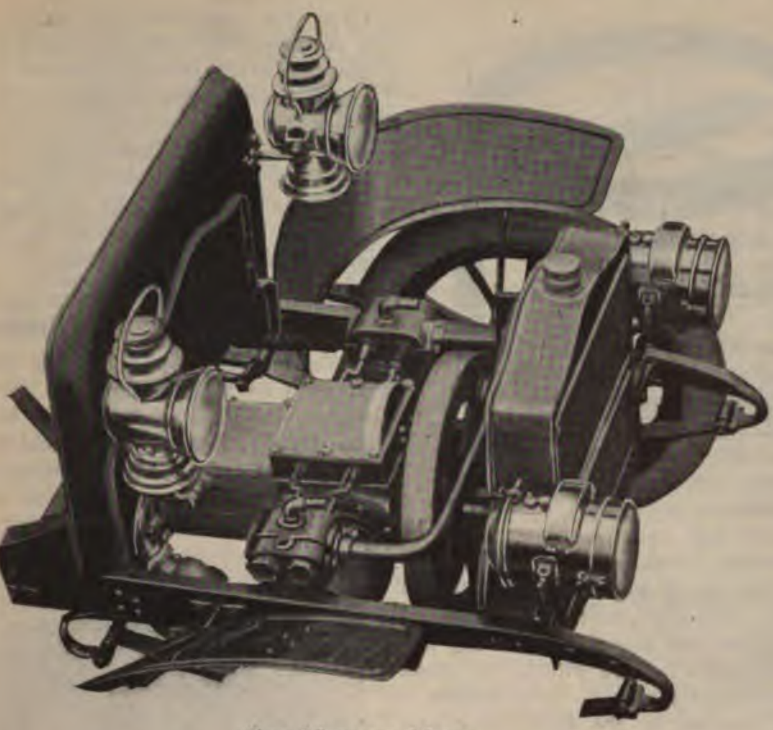
The lubrication of the engine is especially interesting, the manner in which it is effected being shown in the accompanying sketch: The pressure created within the crank case when the pistons move inward is conducted through a pipe to the oil reservoir and used there to force the oil through sight feed drips to pipes which run to the engine cylinder walls. The end of one of these pipes is denoted in the cut by the letter P. The elbow E is screwed directly into the cylinder wall and through this and the pipe communication is established between the oil tank and the interior of the motor casing. When the piston is in the position shown by the full lines, the hole in the cylinder is uncovered and the oil drips through the hole into the connecting rod, which, as has been said, is of a U section; runs along it to the crank and through the hole H to the bearing surfaces. As the piston moves inward, it closes the hole in the cylinder wall, and shuts off the oil supply until the tube T, which passes through the piston, comes opposite it. The oil then drips through this tube and drops onto the wrist pin bearing. The flow of oil, while originally produced by the pressure created by the inward moving pistons, is still further insured by the vacuum formed in the crank case as the pistons move outward, which draws it in.

Another uncommon feature in the construction of the car is that the engine crank case and change gear box are cast in one piece. The planetary change gear group is entirely inclosed within this casing and runs in oil. Two speeds and reverse are provided. The clutches are of the external band type and are adjustable from the outside of the gear box by means of screws fitted with locking nuts.

In order that the line of power transmission may be straight when the car is normally loaded, the engine and change gear box, which practically constitute a unit, are so suspended from the frame that the rear end is lower than the front. The rear bearing of the gear box is designed to take up the thrust delivered to it by the weight of the gears and shafts. Four rings are formed in the shaft which fit into a corresponding number of grooves cut in the bushing. The thrust is therefore divided among these rings and the wear not so great as it would be if it were taken by a



14-H. P. Tonneau.



The Maxwell Motor.

shoulder. This construction also s the bearing practically oil tight. All ngs in the gear box and at the engine , with the exception of the one men-l, are babbitted.

m the change gear box the power is nitted to the rear axle by means of a ller shaft fitted with two universal . This shaft is built up of a solid er and a tube which fits over it, the eing connected, for driving purposes, ans of a feather. Provision is made e necessary amount of lateral move-between the two parts of the shaft, as stance between the universal joints in-s and decreases under the action of rings.

driving power is transmitted to the live xle by means of a pair of bevel gears a ratio of reduction of 3½ to 1. The e casing of this axle is built up in the ntional manner. The central casing is d vertically, is of small outside diam-nd strongly webbed. Into it are forced ubes, which are held in position by screws. These tubes carry the spring ts and outside axle fittings, which serve merely to support the hub brakes. The tubes are extended directly to the hubs of the road wheels and the rollers which support the driving shafts bear directly on their inside surface. Small rings are used to keep these rollers in place and they are themselves secured to the tubes, by small screws.

Ball thrust bearings are placed on either side of the differential but serve merely to take up the thrust of the road wheels when the car is turning or running off the crown of the road. As the thrust from the driving pinion is taken up by a plain bearing between it and the inside of the containing case and that from the larger gear is taken up by a roller which bears against its outer edge. This roller runs in bronzed bushed bearings so designed that a nearly perfect rolling contact is obtained.

The differential group is of the spur gear type in which internal gears are secured to the driving shafts, and the intermediate gears are carried on a frame to which the bevel driving gear is attached.

Two means of braking are supplied—one a pair of brakes on the hubs, which is of the double acting external band type; and the other the clutches in the change gear box for operating the reverse.

The change gear lever is located at the right hand of the operator and the speed of the motor is varied by means of two levers located on the steering column which regulate the timing of the spark and throttle the amount of mixture admitted to the cylinders.

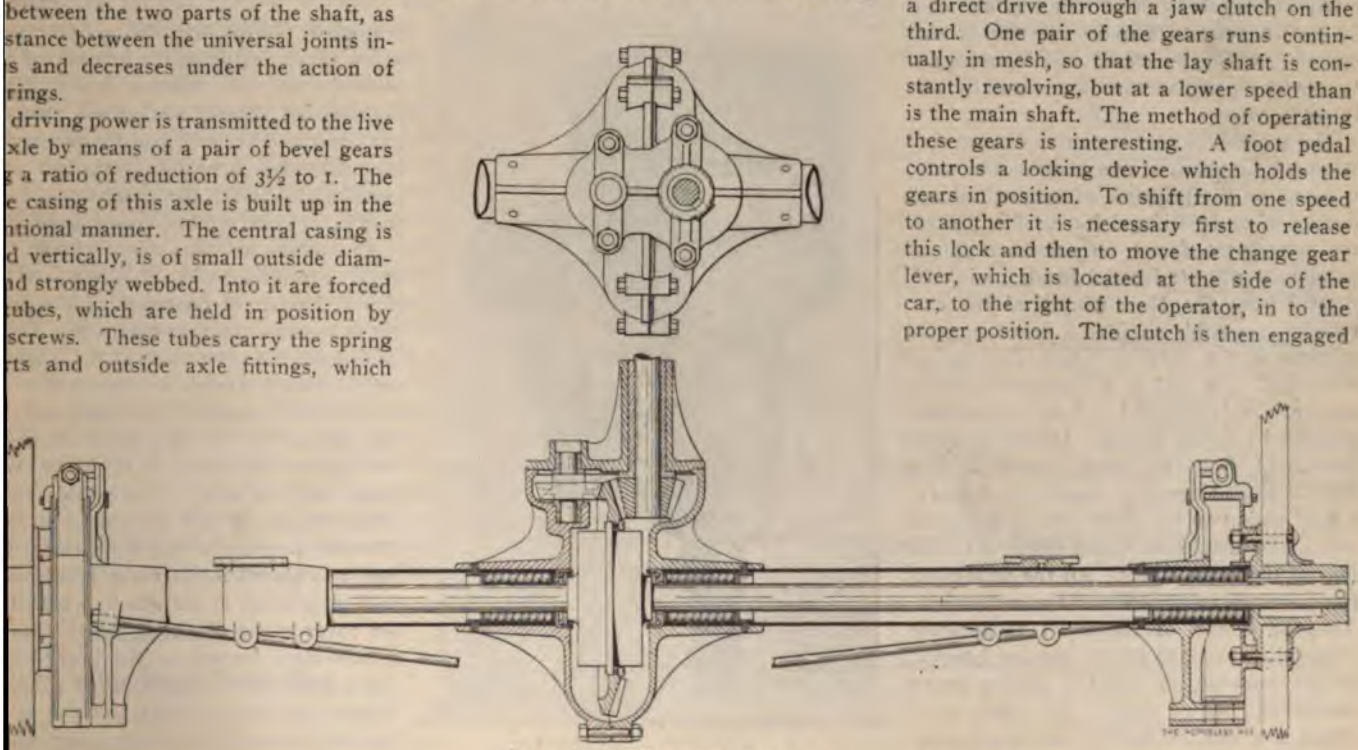
The car weighs about 750 lbs. when ready for the road and is said to have a maximum speed of aproximately 30 miles per hour.

THE TOURING CAR.

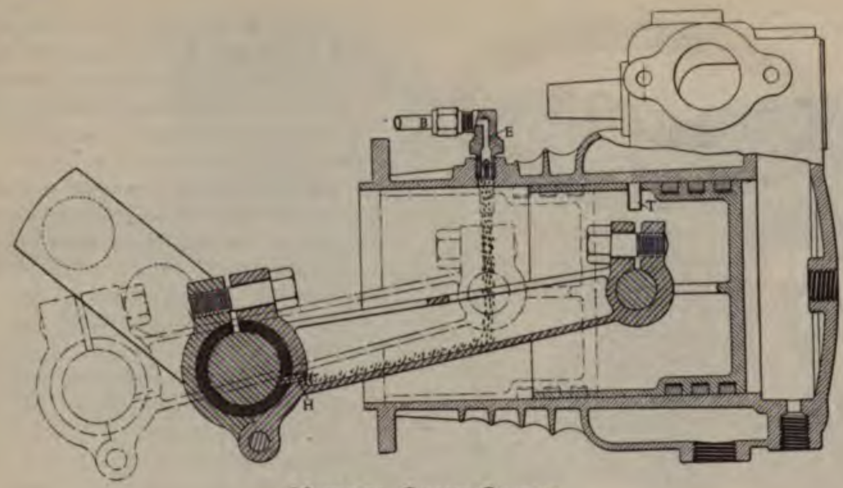
The touring car is fitted with a side entrance tonneau body, but the general construction of the châssis is very similar to that of the smaller car. The motor fitted is also of the double opposed cylinder type, having, however, cylinders of 5in. bore and stroke, and is rated at 14 h. p. at the normal speed of 1,000 r. p. m.

The wheel base of this car is 82in. and wheels are 30in. in diameter and shod with 3-in. tires.

A sliding gear transmission is used, which provides for three speeds and reverse with a direct drive through a jaw clutch on the third. One pair of the gears runs continually in mesh, so that the lay shaft is constantly revolving, but at a lower speed than is the main shaft. The method of operating these gears is interesting. A foot pedal controls a locking device which holds the gears in position. To shift from one speed to another it is necessary first to release this lock and then to move the change gear lever, which is located at the side of the car, to the right of the operator, in to the proper position. The clutch is then engaged



Rear Axle Construction.



Maxwell Oiling System.

with a second lever which works over a notched sector. The hand brake is also operated by this same lever, so that it is necessary to disengage the clutch before applying a braking effort.

Besides the band brake, a second brake is fitted, which is operated by a foot pedal and acts upon a band around a drum upon the transmission shaft at the rear of the change gear box.

The car weighs in the neighborhood of 1,600 lbs., and it is claimed to have a maximum speed of about 40 miles per hour.

The Auto-Meter.

A combined speed indicator and odometer for dashboard attachment is being placed upon the market by the Warner Instrument Company, of Beloit, Wis. A cut of the instrument is shown herewith. The odometer is a standard Veeder instrument with both a trip and a season dial. The trip dial can be turned back to zero at the will of the operator, while the season dial registers up to 10,000 miles and then automatically returns to zero.

The speed indicator is of the Warner Instrument Company's own manufacture and is based on the principle of magnetic drag, instead of on centrifugal force. The dial of the instrument forms an armature for a permanent magnet located inside of it and driven from the road wheels of the car through a flexible shaft at a speed in proportion to the rate at which the car is traveling. The dial is mounted or pivoted on sapphire jewels and is held in the zero position by a hair spring. Motion is communicated from the road wheels to the flexible shaft through a single set of gears, a steel pinion on the lower end of the shaft and a gun-metal gear wheel fastened to the hub of the front wheel. All the fittings of the drive are furnished with the instrument. The lower end of the shaft is securely clamped and pinned to the steering knuckle of the machine, so that the driving gears cannot get out of mesh. The shaft is of ample size and the ratio of gearing is such that it will not exceed a speed of 850 r. p. m. in operation, which leads the manufacture to believe that it will easily wear several seasons. The shaft itself is enclosed in a woven brass and steel casing, strong and oil-tight, which is filled with oil to reduce the friction of the shaft. The friction is further reduced by the shaft being supported on ball bearings at both ends.

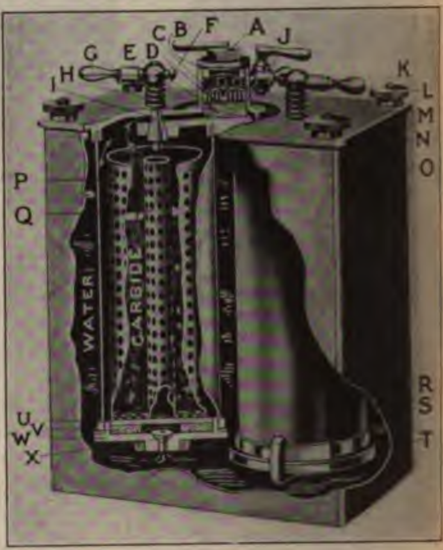
In accordance with the law of magnetic drag, the motion of the dial is proportional to the speed throughout its entire range, and consequently the instrument indicates slow speeds as accurately and distinctively as high speeds. The manufacturers state that they have had some difficulty in convincing users that the device does not indicate too high at slow speeds, as few automobilists realize the difficulty of operating an automobile at less than five miles per hour. It is pointed out that four miles per hour is only a good walking pace. They claim their instrument to be accurate with 1 per cent., and to show a speed so small that it is hardly perceptible to the eye.

The Auto Meter.

The instrument is secured to the dashboard, on the driver's side, so as to be always within his convenient range of vision. The shaft is carried down to the wheel hub either through or around the edge of the car body. The speed dial can be arranged to indicate up to 60 or 100 miles.

Moore's Automatic Valve Generator.

We show herewith a drawing (sectional in part) of Moore's automatic valve generator, manufactured by M. E. Moore & Son Co., of Westfield, Mass., and designed for producing aceylene gas for automobile headlights. As the name implies, the chief



Automatic Valve Generator.

feature of its construction is an automatic valve which regulates the amount of water admitted to the chamber containing the carbide and thereby varies the amount of gas generated according to the amount consumed by the burner, and prevents the accumulation within the generator of more than a certain predetermined pressure.

The action of the valve will be more easily understood when the detail construction and mode of operation of the generator as a whole are comprehended. The containing case O serves also as the water tank and is provided with a cover which is secured to it by means of the studs and thumb nuts K and L. To this cover are secured two cylindrical tubes E E, which extend down into the tank. The carbide baskets, which consist of two concentric perforated cylinders between which the carbide is carried, are placed inside these tubes and are held in position by clamps S, which secure the cover plates W, upon which they rest, to shoulders formed on the lower ends of the outer tubes. A packing of rubber between these cover plates and the ends of the tubes makes the joints water and gas tight.

From the sectional view of one of these tubes it can be seen that the carbide baskets do not rest directly upon these plates, but upon circular pieces of cork felt U, which are supported by cork rings V. By this construction space is provided for the operation of the automatic valves X, through which the water passes. Owing to the porous character of the cork felt the water, when admitted within the tube, filters through it and comes in contact with the carbide in the basket above.

The outlet for the gas is located at the tube E, and is denoted in the drawing by the letter R. The hand valve V, which is operated from the outside of the cover, varies the amount of opening to the passage M and permits the gas to pass through the outlet orifice to the chamber A, which contains a small quantity of compressed asbestos through which the gas must pass before entering the pipe which conducts it to the burner in the lamp. The passing of the gas through the asbestos tends to prevent any unevenness of pressure of the burner and to catch small particles of carbide or foreign matter, which may be carried over by the gas. The valve J is used to regulate the amount of gas passing from the generator or to cut off the supply altogether.

To explain the action of the automatic valve, we will assume that the generator has just been "charged"—i. e., supplied with water and carbide—and that no gas has therefore been generated. It can then be seen that the pressure of water against the bottom of the valve X will cause this valve to open and allow the fluid to pass through into the compartment H and then to filter through the cork felt into the carbide basket. As the water comes in contact with the carbide, gas is generated faster than it can pass out through the outlet R, and a pressure is thereby developed within the tube. When this pressure becomes greater than that of the water against the valve X, the valve will close automatically and prevent the entering of more water until a sufficient quantity of gas has been consumed to again reduce pressure against its upper side, below that of the water on the under side. At this point the valve will again open and the generation of gas go on as before. It will be noticed that the top side of the valve has a larger surface than the lower side, consequently the actual pressure of the gas can be lower than that of the water by a certain amount before the valve will open. It can be seen that when the generator is charged a supply of gas is always stored which can be drawn upon at any time by opening the controlling valves.

Gas-Proof Piston Ring.

W. C. Smith, Amesbury, Mass., has brought out a new piston-ring, which we illustrate herewith. This ring is claimed to be as gas-tight at the joint or lap as in any other portion.

Gas-Proof Piston Ring.

As the lap in the ring closes not only the periphery, but one side of the ring also, gas cannot pass, so the inventor argues, no matter what the expansion or wear. With the milling cutter shown this lap can be made quickly and accurately, and these cutters will be supplied to manufacturers, so that they can cut their own rings.

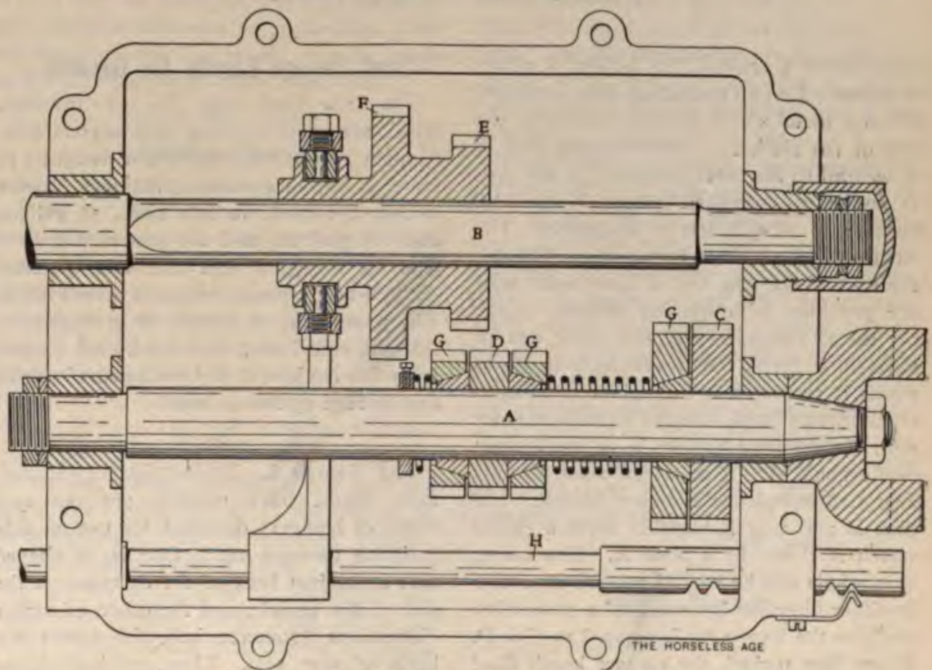
Rushmore's Improved Sliding Change Speed Gear.

With change gears of the sliding pinion type there is likely to be continual battering up of the tooth ends in changing from one gear to another unless the driver is very careful. It is particularly difficult to avoid this battering when dropping into a lower gear while going up grade. On cars that have been in use for a considerable time the teeth of the change gears usually show the abuse to which they have been subjected, and the oil in the gear box is generally full of fine metal chips produced by the hammering of the gear teeth.

To overcome this trouble, S. W. Rushmore, of Plainfield, N. J., has devised an arrangement whereby the pitch line speeds of the two gears to be slid into mesh are equalized before the ends of the teeth touch, thus avoiding all hammering. This result is accomplished as shown in the line cut herewith, in which A is the driving shaft and B the driven shaft. On the driving shaft are securely fastened two gear pinions C and D, and on the squared driven shaft is a set of two sliding pinions E and F. On each side of the gear D and on the free side of gear C is mounted a "friction gear" G, which is held to the shaft only by the friction between two conical surfaces, which are pressed together by a spring.

One important feature of the invention is the means for preventing gradual movement of the shifting lever, with consequent gnashing of the tooth ends. This end is attained by the use of a shifting bar H with large deep notches and heavy spring and roller locking device that will cause the movements to be made in rapid jerks, as is the case with the controller handle on all trolley cars. These notches are so arranged that by the exertion of considerable pressure the sliding gear will be thrown very quickly into full mesh with one of the friction gears. During the time the operator is collecting strength to push over another notch, the frictional torque of the friction gear will have speeded up the clutch shaft to the same speed as itself, and when the next notch is jumped the rigidly mounted gears will go together without shock.

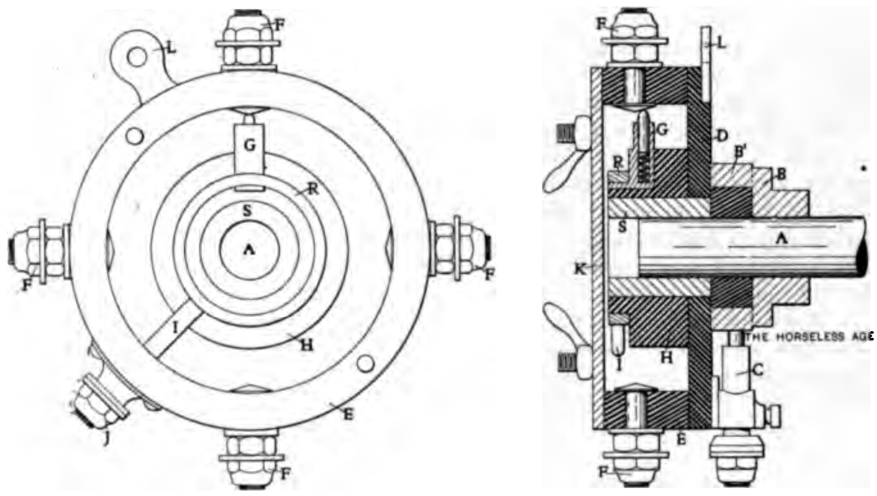
A possible difficulty would be that when the clutch shaft has been brought up to the speed of the friction gear the latter and the adjacent power gear might not have their teeth in line, so it would be impossible to slide the gear into mesh. Mr. Rushmore states, however, that this is largely overcome by bevelling the ends of the teeth, and, besides, if it should ever happen that the gears would not mesh, the sliding pinion could be pulled out of the "friction gear" again and a new attempt made. Mr. Rushmore has had the device in use in his shop long enough to convince him that it avoids all battering up of the tooth ends.



Rushmore's Non-Battering Sliding Gears.

The Altemus Combined High Tension Commutator and Timer.

C. L. Altemus & Co., Harrison building, Philadelphia, are manufacturing a combined high tension commutator and timer by means of which all the cylinders of an engine may be sparked with only one coil. The primary circuit breaker interrupts the primary circuit whenever a spark is to be produced in any one of the cylinders, and the high tension commutator, forming part of the same device, connects the secondary circuit successively to the different spark plugs. Two views of the device, a section and a front elevation, are shown herewith. The device is mounted on the end of the half time shaft A. Securely fastened to this shaft is a metal hub or collar B with lateral projections equal in number to the cylinders to be sparked, extending into peripheral slots in a disk B' of insulating material. The several projections of the collar B and the outer surface of the disk B' form together a smooth cylindrical surface on which bears a brush C, the holder of which is supported on an insulating disk D mounted on a metal sleeve S fitted loosely to the end of the shaft A. An insulating ring E is secured to the outer periphery of the disk D and carries contact buttons F equal in number to the cylinders to be sparked. The stems of these contact buttons pass through the wall of the ring and at their outer ends are provided with binding screws. Upon the metal sleeve S over the outer end of shaft A is forced an insulating ring H, to which is secured a brush holder G containing a contact brush adapted to make contact with the different buttons F in succession; also a metal ring R on which bears a radial arm I to complete the return circuit. The disk D and ring E together form a casing which is closed by a plate K. The casing as a whole can be rocked around its center in either direction by means of a connection made to the lever arm L secured to disk D. When thus rocked, the contact brush C of *the primary circuit* and the contact buttons FF of the secondary circuit are always moved through an equal angle and in the same direction. The primary and secondary circuits are therefore always completed simultaneously.



ALTEMUS TIMER AND COMMUTATOR.

Diamond Rubber Battery Jars.

The Diamond Rubber Co., Akron, Ohio, have added to their product a line of rubber jars for storage batteries. These jars have a total thickness of wall of one-eighth inch, of which three thirty-seconds inch is hard rubber and an outer layer of one thirty-second inch of soft rubber. The soft rubber covering protects the jar from shocks in handling or when the car is driven over rough roads, and another advantage resides in the fact that even if the hard rubber wall should crack the acid could not leak out. The jar is known as a soft cover battery jar and is patented. It is particularly adapted for automobile batteries.

Steel Storage Barrels for Gasoline.

The Iron Clad Mfg. Co., of Brooklyn, N. Y., are manufacturing steel barrels coated with rust-proof preparation designed to serve as buried gasoline containers. These barrels are made in two sizes, 55 gallons and 110 gallons, and are provided with a pipe for filling, a vent tube and a pump. A "tell-tale" device prevents overflowing. The pump can, of course, be arranged inside the auto house if desired. All danger from fire is claimed to be eliminated where this storage system is used.

The George L. Taylor Co., of Springfield, Mass., have recently put out two styles of hampers designed for use on side entrance tonneau cars. One is so shaped that it fits just back of the entrance on the side of the vehicle, and the other, of larger dimensions (40x9x24 in.), fits across the back of rear seat. They are both brass mounted and rubber lined.

COMMUNICATIONS

Two Tests for Locating Insulation Faults.

Editor HORSELESS AGE:

In your recent article by Mr. Clough on locating spark troubles, he does not mention two simple and efficient means of diagnosis which I have found most useful. While there is, of course, nothing original about them, they do not seem to be much used by automobilists, and I therefore venture to call attention to them.

In testing short circuits and insulation in the primary system, use a telephone receiver to indicate the suspected stray current. The telephone receiver constitutes a galvanometer of extraordinary sensitiveness, and if one uses the watch-case form, held to the head by a spring, such as is employed by central operators, nothing more convenient could be imagined, as it leaves both hands free to carry the test wires around the various parts of the car. When the wires are touched to a source of current, a scratching or clicking noise (according to the strength of the current) is heard, so characteristic that it cannot for a moment be mistaken. It has been estimated (Sprague) that one ten-millionth of an ampere can be recognized in this manner. To illustrate this sensitiveness in another way, the following experiment was tried by the writer: An old four-cell battery, too weak to spark, was connected so that a No. 36 B. & S. wire was held by the thumb and forefinger of either hand at the extreme tip in such a way that about three-tenths of an inch was in contact with the skin. Since this wire has a diameter of 0.005 inch, the contact area was approximately 0.0047 square inch. The fingers had just been freed from natural moisture by careful wiping. Upon closing the circuit at the switch, the current flowing through the body from these very poor contacts was sharply audible. In using this method for testing one must naturally employ well insulated wire and hold it by the insulation.

In many of the cheaper American cars the insulation is either originally defective or soon becomes so from heat and moisture, to an extent that slight short circuits are present, causing the batteries to be continually discharging at a very slow rate, even when the switch is left open. Such a condition is often caused by the paper cases of the dry cells absorbing moisture or wearing through from the vibration of the car, even if the wiring is perfect. In this way batteries fail long before they have given reasonable service, and the tendency is to put the blame on the cells themselves, whereas by occasionally disconnecting one of the wires in the battery box and insert-

ing the telephone the trouble would be found out before any damage had resulted.

The second point is in regard to high tension testing. Mr. Clough suggests looking or listening for stray sparks. The way to see them is to test at night. In the dark one can see a spark too small to be heard, and I once found no less than four distinct leaks at one time in the sparking system, which were not sufficient to prevent the regular firing of the engine and which were inaudible and invisible in day time. In this way one not only proves a leak, but sees just where it is and what must be done to prevent it. In the case in question, the engine, while firing regularly, seemed to be off in power, which was fully regained as soon as the secondary leads were replaced, another illustration of the well-known fact that in order to get the best from an engine we must have not only a regular spark, but a hot one. C. W. M.

To Lighten Gasoline Motors.

Editor Horseless Age:

I noticed in a trade magazine that somebody is using Shelby steel tubing for his gasoline engine cylinder.. Now let some other genius surround it with a copper water-jacket, crimped like the elbow of a stove-pipe to form cooling ribs. The two will give a light but strong and safe arrangement.

Why not reduce the weight of explosive engines to less than one-half by using double opposed cylinders, firing them simultaneously to absorb the recoil of the explosion, and equalizing the pressures by means of a tube connecting the cylinders? The tube cylinder and crimped jacket are a good start toward reduction in weight. Auto makers are putting in altogether too much "anvil" to take the hammer of the explosion. Why not throw out the present mass of gearing and add two more of the above light cylinders, weighing, possibly, not one-half as much, cut the four-throw crank-shaft in the middle and connect and disconnect with any of the present good clutches? Then when hill-climbing, mud-hole-extracting power is needed start up the silent pair and go on to happiness and triumph.

Manufacturers are getting back to safe and sane methods, some of them, by reducing weights instead of increasing them. The successful car of the future will not weigh over 500 pounds to carry two passengers. Twenty-five pounds in a bicycle carries a 150-pound man safely now. Then 50 pounds will carry two men and this leaves 450 pounds to devote to body and power.

J. S. Corbin.

[Steel cylinders have been tried repeatedly for engines of racing cars, but have always been abandoned again. It is understood that one of the troubles experienced with them is to keep the joints of the water jacket tight.

Our correspondent is entirely mistaken when he thinks that the reaction of the explosion can be prevented by firing two opposed cylinders simultaneously. Owing to the fact that the explosion occurs between the cylinder head and the piston head, and the piston is connected to the crank, the reaction of the explosion tends to turn the stationary part of the engine in the opposite direction to the rotation of the crank, and if two opposed cylinders are fired simultaneously the reaction is simply twice as great as if they are fired in the normal way —separately at equal intervals. Some four or five years ago a number of double opposed engines were built in which the charge in the two cylinders was fired simultaneously, but they proved unsuccessful for some reason or other, and now all engines of this type are fired each cylinder separately.

The "gearless" car has been a topic of discussion for the last two years, and that is all it is now. It appears practically impossible to make a clutch that will allow of starting the car on the regular gear and not require to be refaced every few days. In stationary gas engine plants the load may be picked up directly by a friction clutch, but these clutches are usually of enormous size as compared with automobile clutches for the same power, and, besides, the clutch in a stationary plant needs to be operated only once or twice a day, while an automobile clutch must be operated dozens of times.

Our correspondent's calculation of weight is also open to objections. If 25 pounds of material will carry one person, 50 pounds ought certainly to carry two if used under the same conditions—that is, in a frame of bicycle form. But a four-wheeled vehicle running gear is an entirely different thing. Besides, it is incorrect to conclude that 450 lbs. of the 500 could be put into the body and power mechanism, as these have to be carried, too, and the frame must be made sufficiently strong to carry them.—Ed.]

Ignition Query.

Editor Horseless Age:

With my four-cylinder engine I use a quadruple spark coil, using batteries to start with, and after starting an Apple dynamo. Twice lately one of the coils has refused to operate with either the dynamo or battery. I tested the circuit from the coil terminal connected to the timer direct to the frame of the engine, with the battery in circuit, but could not get a sign of any current flowing through the coil. I then reversed the dynamo terminals, and with the battery in circuit started up the engine on three cylinders, then threw in the dynamo, and the coil worked all right. After running on the dynamo for a few minutes, I threw the ignition circuit back on to the battery, and the coil still worked all right. I have since made it a practice to reverse the dynamo terminals practically every hundred miles. The coil has never acted this way before. Is it a sign that this one coil of the set is giving out and will sooner or later refuse to work altogether?

You will remember that I wrote you some time ago about the excessively rapid burning away of the points of my timer, and you wrote me that the coil was the cause. Well, I am pleased to write that it was the coil that caused the trouble, and that the makers of the car gave me another coil, and since then the points have not burned at all. It is this second coil that I am now writing about. X. Y. Z.

[We believe that the trouble is due to the fact that your dynamo produces too strong a current, and that the vibrator points become burned or coated with oxide, when they will not conduct the current. This coating of oxide is produced only on one terminal, the positive one, and in such cases it is frequently found that a current can be forced through the contact by reversing the connections.

It may be that your dynamo is running faster than necessary, and if the governor is adjustable we would advise that you adjust it so it will run at a somewhat slower speed, and try it that way. If this should not prove satisfactory, it can be readily set back.—Ed.]

Low Grade Gasoline in Explosive Engines

Editor Horseless Age:

Since reading the contribution on "The Fuel Question" by Mr. Clough in The Horseless Age of Sept. 21, I have tried 72° grade gasoline in my two-cylinder runabout, and find that I have gained quite a good percentage in power, being able to take hills on the intermediate gear that always called for the low before, and also notice an increase in the "push" of the motor when pulled down to near the stopping point by a long hill when running on the high. I found that the carburetor needle valve required to be opened somewhat to admit more gasoline, but do not think that it has reduced the mileage per gallon.

I have been told that 72° would make the engine start hard, especially when cold, but have not noticed any trouble in this respect, and it generally starts on the first turn after warming up, sometimes on the first when cold. The engine uses air from the cylinder head, which, of course, is warmed, but do not think that that has made so much difference, as it starts so easily when cold. I am much pleased with the change, especially as in addition to the increased power the cost is reduced, and so far as my engine is concerned have proved that Mr. Clough's statement is correct.

E. F. Bacheller

Engine Position.

Editor Horseless Age:

Mr. Sturtevant's letter on page 291 of your issue of September 21st opens a big

field and one well worthy of discussion. That an auto makes high speed and shows great reliability, is not necessarily an argument in favor of its adoption for carriage purposes. If the object is simply to go, it will, without doubt, be admitted that preference should be given to the motor and mechanism and that the present design of racing machine is not an incorrect one, in which the greater portion of the vehicle is devoted to the mechanism, while the operator sits behind it where he can watch every part.

But if the object is to carry passengers, a different design must be kept in mind. In this event a hot, smoking motor in front, sending backward more or less unpleasant gases; a profusion of oil cups, spark coils and battery boxes, and a multiplicity of levers, do not harmonize with the carriage idea and clean clothing, particularly if ladies are passengers. It should be quite evident that a large use of the auto cannot be expected if special clothing is required; and while the leather suit is undoubtedly all right in connection with a racing machine, it will not be found to any appreciable extent in connection with carriages in the very near future.

It is a well-known fact that the power should be as near the work as possible. All engineers admit this. It is also admitted that the transmission should be as direct as possible, and that bevel gears should be avoided. It is also admitted that the mechanism should be in a clean, dry place; that it should be most accessible; that weight is detrimental; that strength is necessary; that a low center of gravity adds safety and easy riding qualities, and that the weight must be on the traction wheels very largely, in order to secure traction on icy or slippery, hilly roads.

Because of these facts, I believe in a motor in the rear, horizontally placed (or very nearly so) with crank shaft crosswise of the vehicle, parallel to the rear axle. I have demonstrated that a motor capable of delivering more than 20 h. p. can be placed under the operator's seat. This motor is of the triple cylinder form, which secures the advantages of and is the simplest of the multi-cylinder motors. By placing the heads to the rear and raising them somewhat, with valves and sparker parts on the upper side, the greatest possible accessibility is secured, so much so, that any part of the mechanism can be removed in half an hour. Contrast this with the bill for $21.60 mentioned on page 287 of the same issue of your paper.

By setting the crank shaft below the center of the cylinders, short connecting rods are used without great angularity, which permits a short motor suitable for small space and yet capable of large power. This compactness decreases the weight and requires little framing. Being near the rear axle there is no occasion for a heavy frame *the whole length of the vehicle*, with corresponding saving in the springs, wheels and axles—a total saving of weight of no mean amount. On the motor shaft, nearly inside the fly wheel, the transmission gear is placed, adding but little to the width of the vehicle, and from this transmission just inside of the body a single chain carries the power to the rear axle. This chain is short, runs on large sprockets and is supported by one of the two distance rods necessary to fix the position of the rear axle. A simpler or more satisfactory arrangement is hard to find.

Finally, and of no less value, is the fact that the controlling devices for the mechanism under the seat do not require to be carried a long distance through many angles and joints, but, projecting from the forward edge of the seat, are reached by the operator without effort, in the handiest and most natural manner.

Being under the seat, the mechanism is protected from both rain and mud. It need not be beneath the floor in order to pass under the rider's foot, but is above the floor, and protected from mud at the bottom.

By such an arrangement, no space available for passengers is used. Perfect accessibility without removing the body is secured as well as light weight and a short, strong frame. Odors pass to the rear. Protection from rain and mud is secured. The fewest parts, the greatest efficiency and simplest mechanism can be had this way.

This placing, or some modification of it, is unquestionably the best for American practice, for it permits the construction of a light vehicle, suited to the rough American roads and to the needs of the average American user. CHAS. E. DURYEA.

Observations on the Vanderbilt Race.

Editor HORSELESS AGE:

Having had an opportunity of witnessing the Vanderbilt Cup Race on Saturday from an advantageous spot, perhaps a few observations may be of interest to your readers. Our point of vantage was about a mile and a half from the finish, and on a perfectly level and straight stretch of road, so that the cars passed us at full speed. The sight of the motor cars driving along at a rate of from sixty to eighty miles an hour at this point will never be forgotten. In all my life I have never witnessed anything so intensely exciting and so interesting as the passage of these huge road locomotives. The driving of the various contestants was also interesting to watch. The Frenchmen to a man drove wonderfully well, and the spectator could almost tell by the method of the driving, without looking at the numbers, as to whether the driver was a professional or an amateur, with the exception of Mr. Croker's car. I have never had the pleasure of meeting this gentleman, but the handling of his machine throughout the race was in my judgment in every way equal to the foreign drivers who competed, and I take off my hat to him as a clever and daring sportsman. The cars swerved very little, if any, on this straight stretch of road, and it did not seem as though they were really going at as high a rate of speed as eighty miles an hour, which they undoubtedly did. The most amazing feature of the spectacle to our party, was the fact that over half of the spectators, a large percentage of them having intelligence and fair understanding stamped upon their faces, persisted in gathering in groups on the very center of the roadway and discussing the features of the race, when at any moment one of the flying cars was liable to come tearing down the road. It seems almost beyond comprehension that people endowed with common sense should choose such a dangerous spot, with no apparent reason, since the cars could be seen just as well from either side of the road as from the very center of the oiled surface. Why some of these spectators were not killed can only be answered by the one who guides our destinies. Our party was fortunate enough to time every contestant for each lap, and keep an accurate score, so that we could tell within a few seconds which driver was ahead. Without such a score no one could tell the relative positions of the contestants after the second lap. The driving of the E. R. Thomas car by Hawley seemed especially good, and had the mishap not befallen him, I believe he would have made a splendid showing at the finish, since he drove with excellent skill and judgment. Over a pound of nails were picked up on a stretch not exceeding two miles near where we were stationed, showing the malicious attempt to murder the contestants.

After the race our party drove around the course and had an opportunity of closely observing the two wrecked cars. The car which broke the steering gear and struck a tree was only slightly damaged, if at all, the driver evidently having been able to lessen the momentum of his car before striking the tree, and was probably moving slowly on this stretch of road, which was full of holes and gullies and very dangerous. The steering arm, which is a part of the right front steering knuckle and connects with the rod from the steering post, and provided with a ball joint, was broken near the center, and the break was apparently a clean one, every particle of the metal being bright, showing no crack or flaw. The part was exceedingly light for such work, and appeared to be a casting rather than a forging. The Mercedes which was wrecked was also thoroughly examined. Eye witnesses informed us that one of the front tires came off, and that the driver applied his emergency brake so hard as to lock the two rear wheels so that they slid, this caused the car to skid sideways, when the left rear wheel broke

at the point where the spokes enter the felloe, and this caused this corner of the car car to drop lower than the other three corners. The car must then have rolled over, how many times heaven only knows, crushing the life out of the mechanic and perhaps fatally injuring the driver. I believe that had this driver the skill and experience of some of the other contestants in the race the car could have been brought to a stop without accident, since nearly every other contestant had one or more punctures without serious results. If future races are to be held, it would seem that some system of examination as to the fitness of the driver should be made, to prevent a possible recurrence of an accident of this character.

The most surprising development growing out of the race was the result of several conversations held with spectators who have never owned nor driven automobiles. During and after the race I talked with five different men on the subject of automobiles, and each one of these men declared then and there that they intended to buy an automobile. It seemed to me to be the general impression before the race that a contest of this character did not tend to encourage automobiling, but rather to discourage it. I was exceedingly surprised to learn that this event was the cause of their decision to become automobilists. If a fair percentage of the spectators felt as did those with whom the writer talked, it would seem that the race had been a great benefit to the automobile industry. I should like very much to see some good sportsman with the requisite means and enthusiasm, offer a cup to be raced for by touring cars only. Let a limit be placed upon the size of the engine, so that not over 30 H. P. could be developed. Let the size and weight of the car be determined by present practice in touring cars offered to the public, stipulate that the makers must have built at least ten such cars which have been generally offered for sale, so that in no way could a special car be built for the contest, and, furthermore, compel the cars to race with full touring body and equipment, for a distance of not less than 300 miles. Under these circumstances the designer and manufacturer who produced a car which applied the greatest percentage of power to the driving wheel together with reliability of running and good material and workmanship would win; no dangerously high speeds would be developed, and the public, who are looking for the most perfect and reliable touring car, would then have an opportunity of judging which was the best of the various machines which are offered for sale at a fair price. Such a contest, in my judgment, would arouse more interest than has the race which has just been held, and would be of incalculable benefit to automobilists, and of more value to the trade.

PEUGEOT.

OUR FOREIGN EXCHANGES

The India Reliability Contest.

The conditions of the competition which is to be held next Christmas by the Motor Union of Western India are now to hand. For this contest the Geikwar of Baroda has offered a cup which will be competed for on the basis of reliability, while other prizes will be given for the car in best condition after the trial, the car best suited for district work in India, absence of noise, etc. Any motor vehicle privately owned and driven by an amateur is eligible, with the exception of motor bicycles, tricycles and quadricycles, for which there will be a separate competition.

The cup will be presented outright to the owner of the car which makes the whole journey between Delhi and Bombay (approximately 880 miles) with the least number of unauthorized stops.

Entries will be received for all cars up to December 1, and owners will be required to specify (*a*) the type of car entered and its maker; (*b*) horse power and approximate weight; (*c*) the number of passengers the owner proposes to carry; (*d*) the name of the driver; (*e*) the approximate rupee value of the car landed in Bombay.

The objects of the trial, as stated in the *Times* of India, are:

"To bring prominently before the Indian public the fact that motor-cars have been brought to such a stage of perfection that they are eminently suitable for use in India, more especially for district work.

"To induce tourists visiting India to bring their cars with them, and thus take advantage of the magnificent roads and perfect weather, which are invariably assured to the traveler between the months of October and March.

"To call the attention of manufacturers in Europe and elsewhere to the wants of India in the matter of motor-cars."

International Motor-Cycle Race.

An international motor-cycle race was held over a course some distance southwest of Paris on September 25. It was favored with splendid weather, and was witnessed by thousands of spectators, who displayed great interest in the event. From the beginning loud complaints were heard on all sides concerning the number of big nails which had been strewn for kilometres along the road. The tires of all the competitors were punctured by these several times. After the semi-official notification of the result of the race great sensation was created by the three commissaries of the race, MM. Mirando, Cormier and Saint Chaffray, proclaiming that the race was annulled. No motive for this measure was indicated, but it was presumed that the reason for it was the profusion of nails which had been strewn along the course. This decision will only become definite after its ratification by the International Race Committee.

The course was from St. Arnoult by way of Dourdan, La Foret le Roi, Authon, Ablis, and back to St. Arnoult, a little over 33 miles. This had to be traversed five times in order that a distance of 168 miles might be covered. There were controls of four miles at each of the above-mentioned places. The weather was ideal and the roads in splendid order.

The following started:

England—Thos. Silver (Quadrant), H. Rignold (Lagonda), and J. Hodgkinson (I.A.P.).

France—Lamberjack (Griffon), Inghilbert (Griffon), and Demester (Griffon).

Denmark—Neils Petersen (Dansk Humber).

Germany—Adolf Mraz (Progress Charlottenburg).

Austria—Wenzel Vondrick (Laurin and Klement), Franz Toman (Laurin and Klement), and Folksdorf (———).

Twenty miles out Silver came to grief, being thrown into a hedge near Authon. On examining his tire he found five tacks. Hodgkinson's front rim got damaged and the tire burst near Paray, a few miles farther on. Both were forced to retire. Early in the second round Rignold retired with punctures. Petersen fell behind in the second circuit, and Vondrick assumed the lead. The third round was noteworthy for the fine running of Demester and Lamberjack.

Toman caused considerable sensation by his fine performance in the fourth lap, finishing in the fast time of 38 minutes 36 seconds. Demester, however, had a long lead, and was going very steadily. Early in the last lap Toman's saddle came to grief, and he utilized his hat as a seat. He made a plucky effort to overhaul Demester, but failed.

The final result was:—

	Aggregate time.		
	H.	M.	S.
1. Demester (France).......	3	43	43
2. Toman (Austria).........	4	0	54 2-5
3. Inghilbert (France........	4	15	31 4-5
4. Lamberjack (France).....	4	44	43 4-5
5. Vondrick (Austria).......	4	53	41 2-5

There was a general protest at the finisn by the defeated riders.

At the recent Horse Show at Buxton, England, one of the speakers referred rather disdainfully to automobiling as "various forms of iron mongery."

The Motor Cycle Club of France has issued general racing rules under which all motor cycle races in France will be run in future.

Vanderbilt Cup Race.

Promptly at 6 o'clock on the morning of October 8, the first of the competitors to start in the race for the W. K. Vanderbilt, Jr., Cup left from in front of the temporary grand stand at Westbury, Long Island, for the 300-mile ride over the triangular course. Seven hours and nine minutes later George Heath, an American, born in Astoria, L. I., driving a 90-h. p. Panhard car and representing the Automobile Club of France, crossed the finish line the winner. His net running time was 5h. 26m. 45s. The distance covered, exclusive of controls, was 284.4 miles, so that his average speed was 52.7 miles per hour. The second to finish was Albert Clement, driving a 90-h. p. Clement-Bayard, also representing the Automobile Club of France. The difference in the actual running time of these two was but 1m. and 28s. Clement, after crossing the finish line, turned and drove back to the referee, Mr. Vanderbilt, and entered a vigorous verbal protest. He maintained that he had been misinformed concerning the rules governing taking on supplies and making repairs within controls, and that he had therefore lost time in taking on gasoline while on the course. The protest was not allowed.

While the winner's average time was low compared with that made in some of the recent races in foreign countries, fast time was made by many during the progress of the race, and it was the profusion of tire troubles alone which cut down the average. Teste, driving a Panhard similar to that of the winner, completed the first lap in the net time of 24m. 4s. and the first three laps in 1:15:29, which figures to 66.9 miles per hour. On the straightway stretches the speed at times reached between 80 and 90 miles per hour.

The course is of triangular shape, with Queens, Jericho and Plain Edge as corners. There is practically no grade at any part along its entire length, and the character of the surface is fair, with some few sandy spots. The oil which had been sprinkled over it successfully laid all dust, so that the drivers experienced no difficulty on this score. The turns are very sharp, and the roads at these points very bad, so that the drivers were forced to take them at a very much reduced rate of speed. The course measured 28.44 miles, not counting the neutralized sections at Hicksville and Hempstead. At the former place a three-minute and at the latter a six-minute control was maintained.

At Westbury, the starting and finishing point, a large number of people had gathered long before the hour set for the start. Having been unable to secure sleeping quarters, many had remained up during the night, and many more had left New York by trains or cars very early in the morning. The special deputies who were sworn in for the race entirely failed to keep the course clear. As a car came to the starting line it was immediately surrounded on three sides by the over-curious, and later, between the times at which cars passed, there was much crossing and recrossing of the road. Spectators were to be found walking along the course for its entire length, but they seemed to be constantly on the lookout, and as a car appeared the road was cleared.

One fatality occurred during the race. The car of George Arents, Jr., a 60-h. p. Mercedes, overturned and as a result his mechanic, Carl Menzel, was killed, and Arents himself badly injured. Exactly how the accident happened is not known. This was the first contest in which Arents had ever driven, and he suffered a minor accident early in the race, when coming into the Hempstead control on the first round. He was running at a high rate of speed, and in attempting to stop on the line his car skidded badly. Holding up a hand to warn the crowd, he evidently lost control of his steering momentarily, and the rear of the car swung and hit a tree. Menzel jumped out to see if any injury had been done to the car, and Arents, in his anxiety to back up to the line so that his time could be taken, ran into him and knocked him down. He was not seriously hurt, however. When the car came around to Hempstead on the second lap the tire on the wheel which hit

George Heath, Panhard, Passing the Finish Line.

A. C. Webb, Pope-Toledo, Passing Grandstand.

ie tree was seen to be flat. It was after assing through Queens on this lap that the accident occurred which resulted in Menzel's death. In endeavoring to take a sharp urve at speed the car skidded badly, the rear re flew off, and Arents seemed unable to eep his course. He zig-zagged along the oad for some distance and finally the car urned completely over. Arents was thrown ome distance and was badly bruised and ut. Menzel was pinned beneath the car nd died within a few minutes after reaching a hospital.

There were a few other accidents, but one of very serious character. William Wallace (Fiat), after having effected a mall repair at Jericho on the first lap, ran ver his mechanic, who had fallen in trying get aboard when the car started. He as only slightly injured, however.

A. C. Webb (Pope-Toledo) was on his xth lap when a steering knuckle broke, nd he and his mechanic were both thrown ut. They escaped with a few bruises. one of the other cars were put out of the ce in ways endangering the occupants.

Seventeen cars reported at the starting ne, Sartori, the driver of A. G. Vanderbilt's Fiat, being absent. He had met with accident on the way to the course and d not put in an appearance until 8:20, hen he started two hours late. The other ntestants and their time of departure are ven on another page.

Gabriel was the first to finish the first p, having passed Campbell at Queens. is time was 26m. 57s. Next came Campbell, and after him Webb. Teste, as has en said, completed the lap in 24:04 and as actually in the lead with Heath (25m. s.) second. Clement was in fifth position.

During this round Tracy had trouble with s transmission and was reported to be ut of the race. He, however, managed get running again, and finished the lap in 2h. 29m. 25s. In the second lap he experienced further trouble and was forced to quit. Wallace broke his clutch spring and abandoned the race at Hicksville on the first time around. Tarte was delayed one hour by tire troubles.

At the end of the second lap the contest for second place was very close, Gabriel being but one second behind Heath, and Croker but fifty-one seconds behind Gabriel. The cars of all three were running smoothly. Teste again made the fastest time (25:37) and therefore held the lead. Campbell began to have trouble with his tires. The rim on the left steering wheel became badly chipped and made it difficult to keep a tire on. He continued on through the race, and though in twelfth position at the end of the second lap, gradually worked up in the list as his opponents withdrew, and was running fourth when the race was called off. In this lap Werner and Bernin also went out. A gear shaft in the latter's Renault broke shortly after he had left the Hempstead control and he was no longer a factor to be reckoned with.

There was no change in the leaders during the third round, except that Hawley had worked up from fifth to third place and Gabriel had dropped back to fourth.

During the fourth lap Teste retired and Heath took the lead for the first time and held it thereafter. He was running very regularly and his speed on the straight

View of the Grandstand.

stretches was estimated to be nearly 90 miles an hour at times. Up to the sixth lap his time for the different rounds had varied but three minutes and six seconds, and his average speed was better than 60 miles per hour. In the sixth and eighth laps he was forced to change tires, which delayed him for a total of about 50 minutes.

At the end of the fourth lap Hawley was running second and Gabriel third, while Clement was now fourth. Hawley, however, was forced to quit in the next round through the breaking of his front springs, which occurred where he ran off the road to pass a car and struck a hole.

At the end of the fifth lap Gabriel was second and Clement third of the ten still in the race. With the race half run there were still left two of the German teams, four of the French and four of the American representatives.

Clement came into second position during the next time around the triangle, and remained there during the remainder of the race. He was then 21m. 7s. behind the leader.

Gabriel's motor was seen to be very hot when he ran into the control at Hicksville for the seventh time. He found that the pump chain had broken and dropped off. The bottom had fallen out of his supply box and he had lost his extra chains along the road so that he was forced to retire.

The frame of Croker's car broke partly through and bent badly about midway between the sprocket and axle on the left-hand side while he was making the sixth trip around the course. As the frame sagged the sprocket cleared the ground only by about four inches. He continued on, however, and was on his seventh lap when the race ended.

From the seventh lap the contest was between Heath and Clement, and became closer as the end drew near. At the end of the tenth the time between them had been reduced to 1m. and 28s.

TABLE OF STARTERS.

No.	Driver.	Make and H. P.	Representing.	Time of Start.
1.	A. L. Campbell	60 Mercedes	Germany	6:00
2.	Fernan Gabriel	90 Panhard	France	6:02
3.	Joseph Tracy	40 Royal	United States	6:04
4.	A. C. Webb	60 Toledo	United States	6:06
5.	Geo. Arents, Jr.	60 Mercedes	Germany	6:08
6.	H. H. Lyttle	24 Toledo	United States	6:10
7.	George Heath	90 Panhard	France	6:12
8.	E. E. Hawley	60 Mercedes	Germany	6:14
9.	Wilhelm Werner	90 Mercedes	Germany	6:16
11.	M. G. Bernin	90 Renault	France	6:20
12.	Albert Clement	90 Clement	France	6:22
14.	M. Tarte	90 Panhard	France	6:24
15.	George Teste	90 Panhard	France	6:26
16.	Charles Schmidt	30 Packard	United States	6:28
17.	Frank Croker	75 Simplex	United States	6:30
18.	J. Luttgen	60 Mercedes	Germany	6:32
19.	William Wallace	90 Fiat	Italy	6:34
10.	Paul Sartori	90 Fiat	Italy	8:20:14

After Clement had finished and the result was known, the spectators swarmed over the course and were entirely beyond the control of the police. The worst offenders were those who had come in their cars. Many started up the course in their machines on their way home as soon as Clement's time was announced, apparently having no further interest in the event. In view of this condition of affairs the judges decided to call the race off, and word was telephoned to both controls to hold all cars as they came in.

When the race ended there were five cars still running, two having finished. Of these three were of the American team, namely, Lyttle, with a 24-h. p. Pope-Toledo, who would have been third had the race been finished; Schmidt, with the Packard "Grey Wolf," and Croker with the Smith & Mabley Simplex. The others were Campbell, who drove S. B. Stevens' 60-h. p Mercedes, and who had more tire trouble than any other competitor, losing from this cause about two hours, and Luttgen driving Wormser's Mercedes.

Albert Clement, Clement-Bayard at Speed.

According to the conditions in the deed of gift the cup will be again contested for in this country next year and the Automobile Club of France will have a representative on the commission.

Following is a brief summary of the race: Heath and Clement finished. Lyttle, Schmidt, Croker, Campbell and Luttgen were still running when the race was stopped. All the rest abandoned the race for the following reasons: Werner broke a cylinder. Tracy broke his driving shaft and then cracked a cylinder. Teste broke something on his clutch. Hawley broke both front springs. Arents wrecked his car. Gabriel broke his pump chain and overheated his engine. Webb broke a steering knuckle. Bernin broke a gear shaft. Wallace broke his clutch spring. Sartori started late and was really never in the race. Tarte stopped on account of tire and other troubles.

An attempt was made by the Citizens' Protective Association of Nassau county during the week preceding the race to have it prohibited by the authorities, an application for an injunction being presented to Justice Smith in Brooklyn. The case came up on Friday, but after both sides had presented their arguments, the judge declined to issue a permanent injunction.

Besides the fatal accident during the race proper, another fatality occurred during the period of practice on the course on October 3. On the evening of that day Herbert C. Lyttle, H. H. Anderson and Harold Rigby were driving a 24-h p. Pope-Toledo, entered in the race, over the course. When traveling along the Massapequa road, about

LEGISLATIVE AND LEGAL.

More Trouble in Chicago.

ie continuous performance fight be-
n the automobilists (some of them) of
ago and vicinity and the local police
continues. Many complaints regard-
he reckless speed at which automobiles
driven have recently been received by
police department of the small suburb
ak Park, and the town authorities de-
l to put a stop to the nuisance. On
occasion of the Harlem track races,
ay before last, they engaged a number
pecial constables to time the cars while
ng through the village on their return
the races. Many of the machines
held up (by means of ropes stretched
s the road, it is claimed) and of
s the number was taken, and it is the
tion of the police department to get
names of the owners of the cars from
Chicago registration list and to take
warrants against them. A total of
-seven cars were found to exceed the
le limit.

rather forcible protest against the
lesale hold-ups" of the returning race
ns has been made by John Farson, a
ent of the suburb and president of the
ago A. C. He claims that the con-
s were extremely rude in their meth-
that they broke the lamps on some of
ars and frightened the lady occupants.
laims that some of the cars were
ling at not over two miles per hour,
hat the arrests were an insult to the
mobilists and to the club whose guests
were. The warrants, he says, will
be issued.

. Farson has also recently written a
to Chief of Police O'Neill of Chi-
in which he informs the Chief that
members of his club do not carry any
ers, but carry in a conspicuous place
heir machines a decalcomania mono-
and that their identification is there-
easy. "Let me suggest," he continues,
you issue instructions to your officers
rest every operator of an automobile
member of the automobile club who
to carry a number." Mr. Farson also
that he had observed that most of
who sped their cars beyond the legal
were non-members of the club, while
ak Park police claim that most of the
ng vehicles carried the "decalcomania
gram."

chief of police looked at the matter
somewhat different light from Mr.
n and replied to the latter as follows:

ar Sir: I beg to acknowledge the
t of your communication of Oct. 3.
members of your club take the posi-
hat a certain law is class legislation
nstitutional and void—and in court obtain an injunction restraining this department from the enforcement of such law, you surely concede that it would be class legislation against all other automobile owners as well as your club.

"You state that any member of your organization found operating his machine recklessly 'will be severely disciplined.' Enforcing the laws is the business of the police department and must be done according to law and not in accordance with social rules formulated by clubs and organizations. Respectfully,

"FRANCIS O'NEILL
"Chief of Police."

An ordinance has been presented to the City Council of Columbus, O., which limits the candle power which can be used in headlights on automobiles and street cars.

The case of L. P. Simms who, as recorded in a previous issue, was charged by the Selectmen of Shrewsbury, Mass., with overspeeding his car through that town, has been dismissed by the State Highway Commission upon the presentation of conclusive evidence that his car was not on the road on the day mentioned in the complaint.

An ordinance has been presented to the Council of Tacoma, Wash., which restricts the speed of motor cars to eight miles an hour in the business sections and 12 miles an hour in the outskirts. It also requires that cars be registered and carry numbers one and one-half inches high and one-half inch wide. The fee for registration is to be $2. A committee of motorists attended the meeting of the Council when the bill was presented and had several objectionable features stricken out.

In the case of Percy Crawford, who was arrested for exceeding the speed limit in Washington, D. C., the testimony showed a discrepancy between the reading of the speed meter attached to the policeman's bicycle and that attached to the defendant's car. As Crawford's testimony was supported by that of the other occupant of the car, the case was dismissed.

W. C. Brooks, Superintendent of Streets, Kansas City, Mo., is taking up the matter of the dripping of oil from motor cars upon the asphalt pavement, and will seek legislation which will prevent it.

The ordinance of Milwaukee is threatened with another amendment. It develops that no provision has been made for the transfer of licenses, and the motorists hope to remedy this.

M. F. Collier, of Paragould, Ark., has applied to Judge Hughes of the Circuit Court, for an injunction restraining the operation of all automobiles upon the streets of that city, on the ground that it is dangerous to human life. He was recently thrown out of his carriage when his horse took fright at the car of Eugene Smith.

Harry Coleman, of Newark, N. J., is suing the United States Express Co. to recover for damages done his automobile when one of the defendant company's wagons collided with it.

The city authorities of Chattanooga, Tenn., are preparing to hold automobilists down to the letter of the law.

The tax assessors of Providence, R. I., have taken advantage of the registration list at the State House and have assessed owners for the value of their cars.

The Massachusetts Highway Commission has suspended the license of President Asa Goddard, of the Worcester A. C., for two weeks, for speeding his car through Shrewsbury on August 14 last.

Edward Shotwell, a chauffeur in the employ of L. C. Weir, New York City, was sentenced to a fine of $75 or thirty days' imprisonment in the Court of Special Sessions on Monday, October 10, for having driven an automobile at 65th street and the Boulevard at the rate of 45 miles per hour on October 3. He chose the 30 days. District Attorney Jerome had a letter from Mr. Weir recommending that defendant, who was in his employ only temporarily, be punished.

New Method of Repairing Aluminum Castings.

The Atlas Brass Foundry Co., of 112 Greenpoint avenue, Brooklyn, N. Y., have during the past few months successfully repaired a number of broken aluminum castings—parts of automobiles—by a new and interesting process. The repairs made have been mostly to gear boxes or engine crank cases from which a supporting lug had been broken, or in which a crack had developed. In cases of the first kind, if the part broken off is comparatively small, no attempt is made to use the old piece, but new metal is cast on and the original shape of the part restored. To do this, the larger part of the casting is imbedded in sand for some distance from the break and the smaller piece is used to form a mold for the new metal to be cast on. Molten aluminum, together with a special flux, is then poured into this mold, and is specially treated as it cools. In cases where the casting is cracked, or a large piece is broken off, the method of procedure is somewhat different. Both parts are imbedded in a mold, with the broken edges abutting. The molten metal and the flux are then poured between them and the cooling process used as in the other case.

A perfect continuity of metal from the old part to the new, is said to be obtained in this manner, and it is impossible to tell, even by cutting into the metal, where the old metal stops and the new begins.

Club Notes

BROCKTON (MASS.) A. C.

The club has taken rooms at W. H. Marble's garage on Alton street and will fit them up for club purposes.

A. C. OF CALIFORNIA.

The Executive Committee has decided upon October 12 as the date for the start of the endurance run from San Francisco to Los Angeles.

KANSAS CITY A. C.

Arrangements have been made for a club run to Leavenworth on October 15 to attend the meeting of the Interstate A. A. The matter of petitioning the City Council for amendments to the automobile ordinance has been left in the hands of the legislative committee with instructions to confer with the club's attorney.

A. A. A.

The regular monthly meeting of the directors was held on Tuesday, October 4. Messrs. Whipple, Pardington, Lee, Milbank, Farrington, Chase, Post and Gillette were present. The question of the suspension of Oldfield from further racing was discussed. The protest of the Chicago club was presented, but as no word was received from either Oldfield or the Peerless Co., no final action was taken. Chairman Post of the Touring Committee, read his final report. It was voted to hold a banquet during the time of the New York Show.

DALLAS (TEX.) A. C.

E. H. R. Green has offered a trophy to be competed for by touring cars in a five-mile handicap race during the fall festival.

A. C. A. RESOLVES TO CURB CHAUFFEURS.

At a meeting of the Board of Governors held on October 5, the following resolution was adopted:

"*Resolved,* That in view of the numerous accidents which have occurred recently by careless and reckless driving of automobiles in this city on the part of chauffeurs, that the Governors of this club recommend to the owners of cars that they hold their chauffeurs to a strict accountability, and in case of their arrest and fine, the fines be deducted from the wages of the chauffeur.

"*Resolved,* Also, that the owners of garages in this city be requested to keep an accurate account of each car under their charge, and that they make a weekly report to the owner of each car, stating in each case the day and hour the car was taken from the garage and the hour on which it was returned to same."

Racing Notes.

The North Jersey Motor Cycle Club, of Hackensack, N. J., will hold an eight event race meet on Election Day; entries close with N. D. Campbell, 78 Main street, Hackensack, October 22.

A feature of the meeting at Brighton Beach on October 22 will be the race for the Sea Breeze Cup, open to cars costing less than $1,000. A handicap of one yard will be alowed a car for each dollar that its selling price is below this figure.

The automobile race at the Danbury, Conn., Fair on October 4, was won by G. H. Wheeler (Rambler).

The meet of the Grand Rapids A. C. has been postponed to October 12.

It is reported that Earl Kiser and Barney Oldfield have signed a contract to race at the Cleveland Driving Park track on October 15. The race will be divided into three trials, and will go to the winner in two events. The first trial will be for five miles and the second for ten miles. If a third trial is required the conditions will be agreed upon at the track.

At a meeting of the French and foreign delegates to the International Motor Cycle race at Paris on October 1, it was decided to set aside the decision of the judges and to recognize the validity of the race. The winners are: Demester, first; Toman, secodn; Ingehelbert, third.

Minneapolis Automobilists are planning an automobile meet to be held at Hamlin tracks on October 20.

The Dallas, Tex., Automobile Club has perfected plans for race meets to be held on October 9 and 16 in connection with the Fall Festival.

Chairman Pardington of the racing board of the A. A. A., has written the Rhode Island A. C. in reply to their protest against the non-appearance of entrants at their race meet, that each of the men mentioned in the complaint will be called upon to explain his conduct, and the cases thoroughly investigated.

Philadelphia Race Meet.

The second automobile race meet of the year on the Philadelphia Driving Park track at Point Breeze was held on Wednesday afternoon of last week under the rules and sanction of the A. A. A. The meet was well attended. One of the features of the race was a 10-mile exhibition by E. E. Hawley with E. R. Thomas' 60-h. p. Mercedes car. Another feature was the Point Breeze handicap, which was run in two heats and a final. The first heat was won by Chas. Potter's 24-h. p. Pope-Toledo, driven by Frank Yerger. The second heat was won by Leon Goodman's 24-h. p. Pope-Toledo, driven by Charles Soules, which also won the final heat. In the final heat the two first in each of the trial heats took part, and the starters were two Pope-Toledos, a Peerless and E. R. Thomas' Mercedes. Among the other events was a five-mile exhibition by Tom Fetch with a Packard car, making a time of 8:19. The last event on the programme was Hawley's ten-mile exhibition run. As the wind was quite strong and the turns of the track are sharp the time was no better than 11:35. The track was very dusty and the car was completely shut off from the view of the grand stand except when running against the wind.

N. A. A. M. Meeting.

At last Friday's meeting of the Show Committee of the National Association of Automobile Manufacturers, Inc., sanctions were issued for shows at Philadelphia and Toronto, as follows: Toronto, Toronto Automobile Club, W. J. Morgan, U. S. representative, Press Club, New York, Feb. 27-March 4; Washington, Washington Auto Dealers' Association, B. C. Washington, Jr., Manager, March 27-April 5.

At the meeting of the Executive Committee the Freight Committee reported that it had been given a hearing before the Official Classification Committee and had reason to hope that there would be a reduction in freight rates in the near future.

Resignation of the Hyatt Roller Bearing Company and the National Cement & Rubber Company as associate members were accepted. Corbin Motor Vehicle Corporation, of New Britain, Conn., and the Phelps Motor Vehicle Co., of Stoneham, Mass., were admitted to membership. The Daimler Company was reinstated and the name of the Berg Company changed to the Worthington Automobile Co.

S. A. Miles, general manager, was again elected the association's representative on the Commitee of Allotment for the New York Show.

Perhaps the most important work of the meeting was the decision to refer to counsel the question of the legality of requiring automobilists to take out licenses with a view to undertaking a test case. The particular difficulty which brought about this decision is that which makes it necessary to be provided with licenses for a number of States before attempting a tour of any length. The association is now determined to ascertain whether a license is necessary in any State, and if so, whether a license issued by one State is not, of necessity, to be accepted by the authorities of other States.

Test Run of Superintendents and Engineers.

The automobile run of superintendents and engineers connected with the firms of the Association of Licensed Automobile Manufacturers, took place on Friday, October 7, over a 70-mile course in the vicinity of New York City, starting from the Locomobile Company's garage at Broadway

th street. There were twenty cars in n, which were occupied by fifty-three All changed cars ten times during the o as to give every one of them a to drive each of the different ma-. The run was started upon in the ng, and was made at a leisurely gait, erage speed being only ten miles per All the machines got back in good to the city in the evening, the only s reported being six punctures. In ning a supper was served at the Cen-rk Casino.

New Incorporations.

on Auto Dispatch, Portland. Capi-0,000. Incorporators: H. W. God-C. A. Bell, R. C. McIntosh.

ago Automobile Co., Chicago, Ill. , $50,000. Incorporators: F. M. M. E. Mogg, W. A. Whirlwall.

d Automobile Co., Pittsburg, $10,-Directors: John A. Hawkins, George ing, Frank W. Anderson. Pittsburg.

Automobile Co., Bristol, Conn. , $50,000. Incorporators: Fred A. F. N. Manross and Epaphroditus

-Underhill Co., Boston, to buy and tomobiles. Capital, $5,000. Incor-s: G. G. Reed, A. P. Underhill and Underhill.

hire Automobile Co., Pittsfield, Capital, $15,000. Incorporators: V. Mercer, F. W. Wyland, F. A. C. P. Hollister.

rs Automobile Co., Springfield, Capital, $100,000. Incorporators: vers, Charles M. Woodward, J. P. , William H. Sherman, Wm. H.

Zent Automobile Manufacturing Co., taine, O. Capital, $25,000. Incor-s: S. W. Zent, C. E. Yoder, Joseph gen, W. W. Osborn, John P. Aikin, W. Smith and W. R. Cordray.

tion for Vulcanizing Tire Patches.

M. & M. Mfg. Company, Akron, O., ought out what they term a vulcan-bstitute, consisting of a chemical said to cause vulcanization of the tion used in applying a patch, with-application of heat. Ordinarily a applied to a tire with rubber solu-sisting of crude rubber dissolved line. Unfortunately this layer of bber between the patch and the tube en when subjected to a temperature F., and will allow the patch to come d the only method of securing a rmanently in place is to vulcanize The necessity for this operation is to be avoided, however, by the use M. & M. acid cure solution, in con-with the M. & M. tire cement.

olution is claimed to contain sul-d to produce the same effect upon e rubber of the cement as does the regular vulcanization process. The solution can also be used for splicing inner tubes and putting on semi-cured treads and non-slipping bands on outer shoes. When a patch, etc., is to be applied the surface where it is to be placed is first scoured thoroughly, removing all the bloom and chafing the surface. It is then washed twice with benzol or gasoline, which is allowed to evaporate; then several coats of cement are applied to both surfaces, and then a coating of the acid cure solution to the surface to which the patch is to be applied, then the patch is put in place and pressed tightly, as usual. The patch should be applied immediately the acid solution has been brushed over the surface of the tube.

Commercial Vehicle Notes.

An automobile livery service is soon to be opened in the East End, Pittsburg, Pa.

The Chicago & Great Western Railroad is experimenting with motor propelled track inspection cars.

The management of Euclid Beach Park, leveland, O., is planning to establish an automobile passenger line between that park and the city for next season.

The St. Louis, Brownsville and Mexico Railroad has arranged to establish an automobile passenger and mail line between Brownsville, Tex., and a break in the road to Arroyo, Colo., so that communication may be maintained while repairs are made.

A new use for gasoline motors has been found by a Kansas farmer. When the grain was to be reaped in a certain field in that State, some months ago, it was found that the soil was so soft that the binder main wheel would not grip sufficiently to drive the cutter and binding mechanism. The farmer then disconnected everything from the wheels and connected it to a gasoline engine which he mounted on the binder frame. The horses then simply hauled the machine along, while the gasoline engine operated it.

New Parts Firm.

The A. O. Smith Company, of Milwaukee, has purchased the plant and business of the Smith Stamping Factory, heretofore operated by the Federal Manufacturing Company. The transfer was officially concluded on September 14, but the property has been operated by the Smith Company since August 1. The Smith factory is claimed to be the largest automobile parts making establishment in the country. Its products comprise standard and special pressed steel frames, complete rear axles with chain and bevel gear drive, complete front axles, tubular and forged, malleable and pressed steel hubs, wheel and lever steering gears, cone clutches, change gears, connecting rods, machined forgings, steel rims, steering wheels, spark and throttle levers and brake parts.

Trade Literature Received.

A. R. Mosler, 1679 Broadway, New York city—Leaflets on on his spark plugs and commutator.

The Wm. Cramp's Sons Ship and Engine Building, Co., Philadelphia—Booklet in regard to automobile castings.

Thorn Mfg. Co., 5 Front street, Salem, Mass.—Illustrated folder showing various styles of the Thorn automobile clock.

George R. Taylor Co., Springfield, Mass. —Catalogue D, showing baskets and hampers, especially those for use on side entrance tonneau bodies.

The Haynes-Apperson Co., Kokomo, Ind. —Folders in regard to their tonneau and runabout cars.

The Covert Motor Vehicle Co., Lockport, N. Y.—Booklet on the performance of the "Covert" in the recent St. Louis tour.

The Continental Caoutchouc Co., 298 Broadway, New York City—Price list folder of Continental tires and accessories.

Duryea Power Co., Reading, Pa.—Booklet of testimonials from users of their cars.

Morgan & Wright, Chicago, Ill.—"Clincher Tire Guide Book," being a general treatise on the use and care of clincher tires.

Black Diamond Automobile Co., Utica, N. Y.—Pamphlet regarding "Buckmobile" cars.

Grant-Ferris Co., Troy, N. Y.—Catalogue of their gasoline motors.

The Garvin Machine Co., Spring and Varick streets, New York City—"Special Machinery," a booklet regarding machines adapted to special automobile work.

Cook's Sons, 313 West street, New York —Pamphlets regarding Albany grease.

The Warner Instrument Co., Beloit, Wis. —Circular of the "Auto-Meter" (combined speed indicator and odometer).

C. L. Altemus & Co., Harrison building, Philadelphia, Pa.—Circular of combined high tension commutator and timer for automobile and marine purposes.

Cleveland Y. M. C. A. Auto School.

An automobile school will be established by the Cleveland Y. M. C. A. the coming winter, and it is proposed to include in the course of study much practical work in the way of assembling, repair work, and actual road practice. The elementary work will consist in the theory of two and four cycle engines, the carburetor, igniter, transmission gear and other accessory parts of the automobile. At different stages in the study of these parts, demonstrations will be given in the shop to illustrate the principles involved. The advance work will be for machinists and draughtsmen who wish to study the construction and repair of machines. J. M. Bellin will be the instructor. The lectures will be given at the Y. M. C. A. building, while the practical work will be done at the Automobile Garage and Repair Co., No. 404 Huron street.

MINOR MENTION

An automobile club is being organized in Tacoma, Wash.

A movement is on foot to organize the Western Automobile Association in Spokane, Wash.

A feature of Real Estate Men's Day at the St. Louis Fair, October 5, was a parade of decorated automobiles.

The City and Suburban Houses Co., of Detroit, is letting contracts for the erection of a two-story factory for the Matheson Motor Co.

Messrs. Cheney Bros., of South Manchester, Conn., have closed their hackney stable and will hereafter conduct an automobile salesroom.

The factory of the National Motor Vehicle Co. at Indianapolis was closed for ten days pending an inventory and opened again on October 3.

The Wm. Cramp & Sons Ship and Engine Building Co., of Philadelphia, have recently considerably enlarged their automobile casting department.

The Pittsburg Y. M. C. A. will conduct an automobile school the coming winter. R. J. Dearborn, of the Westinghouse Co., will be in charge as instructor.

Under "Trade Literature Received" in our last issue the address of the Fellows Gear Shaper Co. was given as Springfield, Conn., instead of Springfield, Vt.

The Walworth Mfg. Co., of 128 Federal street, Boston, have recently put on the market a Stilson wrench designed to meet the requirements of automobile service.

H. H. Holcomb, driving a 24-h. p. Columbia touring car, established a new record for the run from Chicago to New York last week, covering the distance in 58h. 45m.

V. E. Ripper, of the Ripper Motor Carriage Co., of Buffalo, is reported to have disappeared last week. The company, it is said, is in debt to the amount of $50,000.

The Pontiac (Ill.) Body Co. have increased their capital stock from $30,000 to $50,000 and will erect a new building and begin the manufacture of automobile bodies.

The final meeting of the creditors of the Jones-Corbin Co., bankrupt, is called for Wednesday, October 19, at 3:15 p. m. The account of the trustee will be considered and passed upon.

The Law Automobile Co. has been organized in Bristol, Conn., to manufacture cars designed by Fred A. Law, formerly with the Electric Vehicle Co. The authorized capital stock is to be $50,000.

The National Motor Vehicle Co.'s exhibit at the World's Fair has been taken charge of by Thomas Hay, the company's sales manager, who will be at the stand for the next two or three weeks.

According to the Detroit *Times*, of the 346 persons injured on the streets of that city since May 1, 154 were hurt by street cars, 105 by horse-drawn wagons, 63 by automobiles and 24 by railroad cars.

Charles Clifton, of the George N. Pierce Co., has been authorized to appoint a committee to draw up plans for a permanent organization of the automobile engineers.

A meeting of the automobilists of New Britain, Conn., was held during the past week to formulate plans for the organization of a club, which will also be joined by motorists of Berlin, Plainville and Bristol.

The automobilists of Kentucky are up in arms against the turnpike companies throughout the State, because of their action in raising the toll rates. The new charge is five cents per mile per horse power.

Three persons were killed and six more or less seriously injured on October 6, when a large touring car was driven over a bank near Macomb's Dam Bridge, on Jerome avenue, New York, and fell in front of a train. The occupants of the car were all under the influence of liquor at the time of the accident.

In the suit of Attorney W. A. Jennings against the Chicago A. C., to compel payment of a bill of $500 alleged to be due him for services rendered as counsel in the club's fight against the constitutionality of the city numbering ordinance, Judge Mack rendered a decision on October 4, allowing complainant $183.

It is reported that the engineer who was engaged by a committee of the Toledo A.C. to draw up a road map of Toledo and vicinity chartered the map from an old government survey which was not accurate, the result being that a number of roads are shown which either do not exist, or are only blind lanes which "lead to nowhere." The map cost the club about $200.

Meeting of Motor and Accessories Manufacturers.

The directors of the Motor and Accessories Manufacturers' Association met at the Hotel Astor, New York City, on October 6. A show allotment committee, consisting of D. J. Post, chairman, and Messrs. Castle, Dunn, Smith and Chapin, was appointed. This committee will prepare a diagram of the space allowed by the N. A. A. M. at the New York and Chicago shows and will distribute it among the various members. A resolution was passed recommending that members exhibit only at shows sanctioned by the N. A. A. M. New members were elected as follows, making the total membership sixty-seven: Federal Mfg. Co., Cleveland, Ohio; Parrish & Bingham, Cleveland, Ohio; Dow Portable Electric Co., Braintree, Mass.; Wray Pump & Register Co., Rochester, N. Y.; Auto Coil Co., Jersey City; Warner Instrument Co., Beloit, Wis.; Continental Rubber Works Co., Erie, Pa.; F. E. Wadsworth, Detroit, Mich.; Manufacturers' Foundry Co., Waterbury, Conn.; Carlyle Johnston Machine Co., Hartford, Conn.; The Webb Co., New York City.

One Class of Automobilists.

The following is an abstract from a private letter by the chauffeur of a well-known Western politician, which has been submitted to us by the recipient. It appears from this that there is a certain class of automobilists who use an automobile much as a railroad train—entering when ready to start and stepping out upon arrival, without ever giving any thought to the mechanism of the car. They employ a chauffeur to attend to all details and simply pay the bills. In explanation of the extreme ignorance shown by some of the men who rode in the car, with regard to the functions of the different parts, it should be explained that the vehicle is used in a part of the country where autos are still more or less of a curiosity.

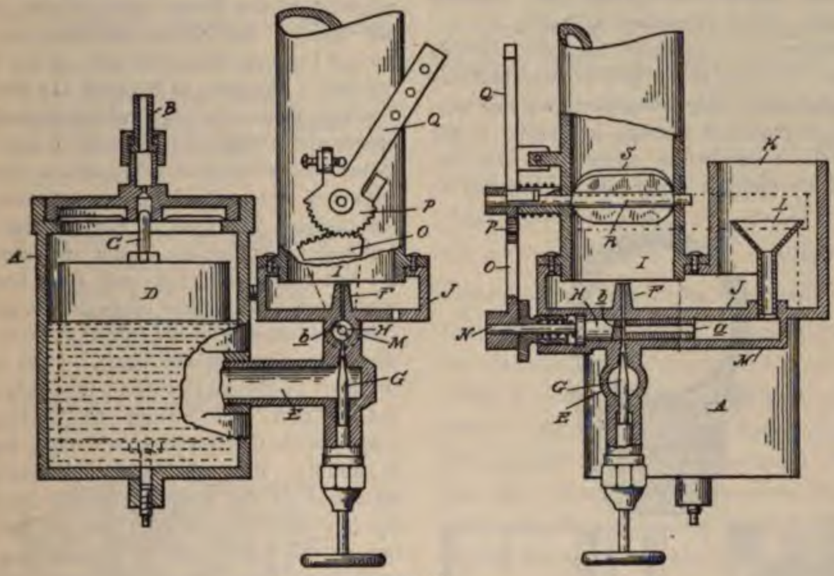
"Had just time to have a plate bolted on to the side when ——— called up for the car. Had a party of friends he wanted to take for a spin on the flat. I knew exactly what that meant, and prepared for a run until two or three in the morning. He likes to load the car down and run up and down the nine-mile road at full speed. The road is very good as far as the five-mile house, and about a hundred feet wide. We very often have eight in the machine and run 45 miles an hour as far as the five-mile house without slacking up. I had rather take it easier, but when I do run at a moderate speed ——— wants to know if there is something wrong with the machine, and I have to let it out to show him there is not. I would like it better if he would take the trouble to understand something about the care a machine like this requires in this country. He seems to think that when the car is ever put in shape it should stay so regardless of the usage it receives. Have tried to explain things to him at times, but he is always too busy with his politics to listen. He nor any of his people have ever seen the engine or any working part of the car, and if he did not have some good-sized gasoline bills to pay, do not think he would remember whether it is gasoline or electric. One of the men did become interested enough the other day to ask if the bonnet was the gasoline tank, and another happened to notice the flywheel and wanted to know if that was what charged the batteries and wondered if the radiator contained the electricity."

MOTOR VEHICLE PATENTS.

United States Patents.

771,096. Carburetor for Explosion Engines.—E. C. Richards, of Detroit, Mich. Sept. 27, 1904. Filed Jan. 11, 1904.

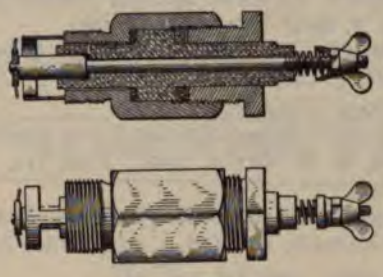
The carburetor is of the float-feed, spraying type. In the spray nozzle is arranged a plug valve, which is adjustable to restrict the passage in the nozzle. The plug valve is drilled out through its center and is placed in an air conduit communicating with the atmosphere.



No. 771,096.

The operation is as follows: The level of oil maintained in the receptacle A by the float D is normally below the upper end of the nozzle F, but is above the conduit M and the valve H. As a consequence the oil will normally fill the passages *b* and *a* within the valve H and also the space within the conduit M. The suction of the engine will cause the drawing in of the current of air through the tube K and casing J into the tube I. A portion of this air-current will strike against the funnel L and will be directed down into the conduit M, striking an air-pressure on the liquid therein, which will cause it to be forced outward through the nozzle F into the air-current in the conduit I. The ejection of the oil will also be assisted by the suction resulting from the movement of the air-current past the nozzle. The quantity of air carbureted will be regulated by an adjustment of the lever Q, which will shift the position of the butterfly-valve S so as to variably restrict the conduit I. The movement of the lever will through the connection of the gear-segments P and O impart a corresponding rotation to the stem N of the valve H, thereby variably restricting the oil-passage *b* of said valve and controlling the amount of oil ejected from the nozzle.

771,683. Electric Ignition Device for Internal Combustion Motors.—Charles W. Swensson, of New Britain, Conn.—October 4, 1904. Filed June 17, 1903.



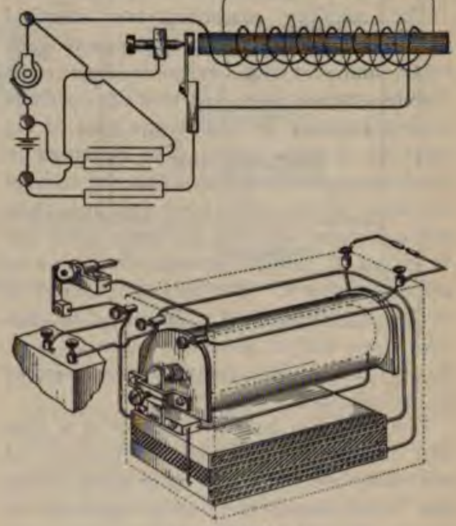
No. 771,683.

The invention relates to jump spark plugs with a novel form of terminals. One terminal consists of a stationary annular ring, and the other terminal consists of a revoluble member having a plurality of points. The sparking can therefore occur from any one of the points to the other annular terminal, depending upon which gap presents the least resistance to the passage of the current. The movement of the rotatable terminal is accomplished by the ordinary vibration of the engine. It may also be moved by hand. The central terminal may be pressed inward against the pressure of a spring, so as to manually change the position of the terminal or sparking points.

771,610. Power Regulating Mechanism.—Fred. H. Chapman, of Groton, Mass. October 4, 1904. Filed May 25, 1904.

According to this invention a heavy weight or pendulum is mounted on a car to automatically control the power to correspond with the grade. The gravity mechanism may be employed to increase the boiler feed in a flash-steam car, to open the throttle in a gasoline car, etc. The devices operated on by the gravity mechanism may also be controlled by hand.

771,332. Induction Coil.—John Splitdorf, of New York. October 4, 1904. Filed February 23, 1904.

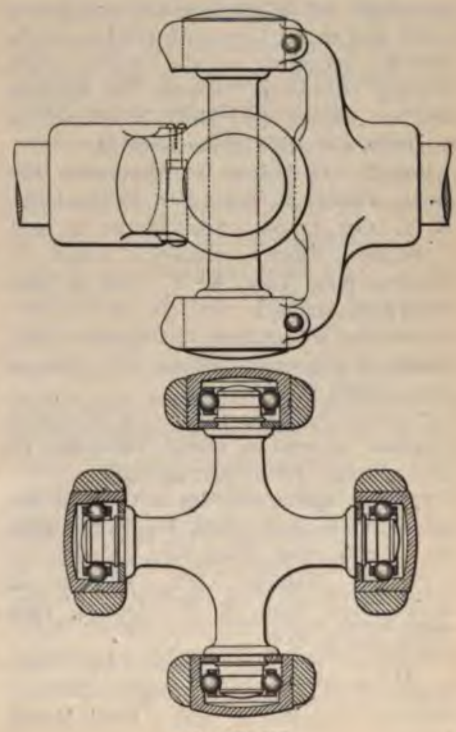


No. 771,332.

In an induction coil for gasoline engine ignition, two condensers are provided, one connected in parallel with the coil vibrator and one in parallel with the circuit breaker. The use of an auxiliary condenser in parallel with the circuit breaker is claimed to allow the operation of the induced circuit in a jump-spark coil whose primary circuit is closed between the vibrator and adjusting-screw.

771,637. Universal Joint or Coupling for Shafting, etc. E. G. Hoffmann, of London, England. October 4, 1904. Filed October 5, 1903.

The invention aims to provide a universal joint in which ball-bearings may be employed which is of a simple construction,



No. 771,637.

is easily assembled and taken apart, and in which the bearing parts are carried as far as possible outside of the central line of the two connected parts.

The coupling comprises two identical yoke-pieces placed at right angles to each other, and carrying bosses on their ends. The bosses are open, and into the openings project journals formed on the ends of the arms of a cross piece. The openings in the bosses are of such size that the ends of the arms of the center piece can pass clear through same, whereby the center piece can be placed in position between the bosses by suitably tilting it. The outside openings of the bosses are adapted to be closed by caps which are held in place by means of keys, flexible felt washers encircling the journals to exclude dust.

The balls are held in position in a cage and are inserted between the journals of the center piece and the inner walls of the cap, which closes the outside openings of the bosses. The journals, which form the "cone" portion of the bearings, are provided with grooves forming a race for the balls, and the inner walls of the cap, which form the "cup" portion, with a plain cylindrical surface, as shown, forming the other race. The center piece can be disconnected by simply withdrawing one of the caps, thus allowing the journal in that boss to be passed into the outside opening, with the result that the journal on the opposite arm will be withdrawn through the inside opening clear of its boss in the opposite manner to that employed for inserting it.

771,565. Automobile.—Henry Nyberg, of Chicago, Ill. October 4, 1904. Filed Sept. 13, 1902.

In a car with a single cylinder horizontal motor in the body, the change speed gear is mounted on a shaft separate from the engine shaft, but in line therewith and having a ball and socket joint with the hub of the flywheel mounted on the engine shaft. Driving connection between the flywheel and the change gear shaft is effected by means of a flexible spring coupling.

771,492. Carbureter for Explosive Engines. Charles F. Parmenter, Portlandville, N. Y. Oct. 4, 1904. Filed March 12, 1904.

771,498. Electric Battery. Isaiah L. Roberts, New York, N. Y. Oct. 4, 1904. Filed Oct. 14, 1903.

771,538. Wheel Rim for Hollow Tires. Elmer M. Downs, Chicago, Ill. Oct. 4, 1904. Filed Jan. 11, 1904.

771,616. Sparking Device for Explosive Engines. Samuel E. Doane, Cleveland, O. Oct. 4, 1904. Filed Nov. 13, 1903.

771,631. Igniter for Gas or Gasoline Engines. Peter P. G. Hall, Jr., Philadelphia, Pa. Oct. 4, 1904. Filed Nov. 19, 1902.

771,640. Vehicle Tire. William R. Howe, New York, N. Y. Oct. 4, 1904. Filed July 9, 1900.

771,674. Fastening Device for Pneumatic Tires. Thomas Sloper, Devizes, England. October 4, 1904. Filed March 12, 1904.

771,261. Variable Speed Transmission Gear. Charles Monin, Le Mans, France. Oct. 4, 1904. Filed Dec. 8, 1903.

771,272. Resilient Tire. Sam T. Richardson and Richard Price, Birmingham, England. Oct. 4, 1904. Filed Oct. 30, 1903.

771,296. Protector for Pneumatic Tires. James F. Burnham, Madison Station, Ala. Oct. 4, 1904. Filed Feb. 20, 1904.

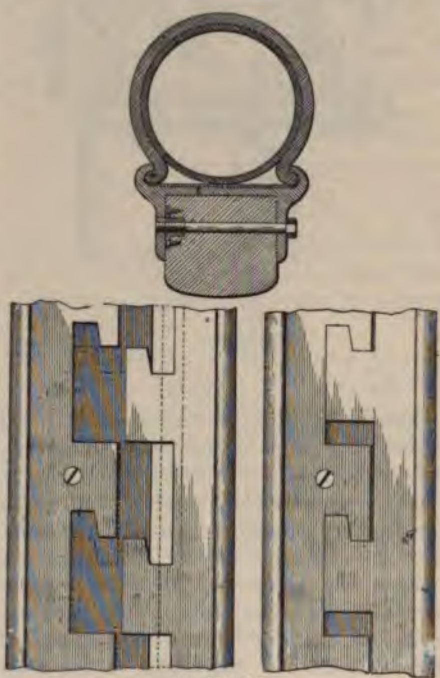
771,320. Internal-Combustion Engine. Oscar P. Ostergren, New York, N. Y. Oct. 4, 1904. Filed Oct. 2, 1903.

771,651.—Wheel. Edward S Lea, Rutherford, N. J. Oct. 4, 1904. Filed Jan. 16, 1904.

771,721. Drive Chain. James M. Dodge, Philadelphia, Pa. Oct. 4, 1904. Filed May 18, 1904.

771,445. Rim for Rubber-Tired Wheels. —O. L. Pickard, of Chicago, Ill. October 4, 1904. Filed December 30, 1903.

Relates to a two-part rim for clincher tires. The rim is divided circumferentially through the body into the two sections. One of the rigid sections is secured to the felly by a number of screws, the two sections of the rim being further secured to

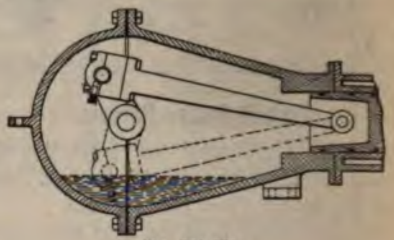


No. 771,445.

the felly by a number of clamping-bolts inserted through the removable part of the rim and having a threaded engagement with the rigid part. A socket-plate is recessed in the felly on one side and fastened in place by screws, and bolts pass through and have a threaded engagement with the socket-plate, which affords additional holding-ground in properly securing these parts together against displacement.

The inner edge of the rigid rim part is cut out at two different points in providing entering companion recesses having locking-recesses opening thereinto from the ends. These recesses are adopted to take projections on the other part of the rim, as clearly shown.

771,571. Crank Pin Lubricator.—W. B. Pearson, of Chicago. Ill. October 4, 1904. Filed Sept. 18, 1903.



No. 771,571.

The means for lubricating the crank-pin bearing are as follows: Formed in the bottom or lower side of the crank-pin bearing is a transverse groove, contained in which is an absorbent packing of wicking. The groove communicates with openings adjacent to the lateral sides of the crank-pin bearing and which extend from the groove through the under side of the bearing-box. The ends of the wick are inserted through these openings, which operate to secure the wicking in the groove and also to lead the wicking downwardly, so that its ends will enter the lubricant contained in the casing. The ends of the wicking project beyond or outside of the openings and are left free so that they will form brushes which will quickly take up or absorb a considerable quantity of the lubricant each time they pass through the same. Thus when the level of the lubricant is sufficiently high the brushes will always be thoroughly soaked with the lubricant when the engine is running. From the brushes the capillary attraction of the wicking operates to draw the lubricant into all parts thereof, and being on the under side of the bearing, the centrifugal force due to the rapid revolution of the crank will operate to force the lubricant from the wicking onto the surface of the crank-pin as the crank passes through the upper portion of its revolution.

771,457. Universal Joint.—E. W. Bullard, of Springfield, Mass. October 4, 1904. Filed May 18, 1904.

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The Tire Bugbear.

The profound dissatisfaction with the pneumatic tire which has existed in all quarters of the automobile world for years past, seems during the past season to have met with no relief. In fact it is not unlikely that it is entering upon a critical stage, and it may be that a revolt against the annoying frailties of this peculiarly undependable portion of the equipment is not far off. The mechanism of automobiles—the ignition, the change-speed gear and other hitherto vulnerable portions of the vehicle have been improved during the last few seasons to such a wonderful degree that the difficulties experienced in the employment of motor cars, so far as their motive power is concerned, have been remarkably minimized. On the other hand, the reliability of the pneumatic tire has increased hardly perceptibly during the same period and its shortcomings form a larger and larger proportion of the total failures chargeable to the vehicle as a whole. In the earlier history of the art, automobile runs and tours were constantly being interrupted by breakages of the engines or transmission devices, by faulty ignition or failures of the cooling systems, so that tire punctures or blow-outs, although they were constantly occurring, were not so seriously noted as they are to-day when other sources of trouble have been so nearly removed. It is very common to-day to hear an owner who has been making a tour, make the remark that the machine ran perfectly but that he could not keep tires on it. The extremely large place which tire troubles are beginning to take in the total trouble account is apparently leading owners to a state of disgusted despair and it is not surprising that a large body of automobile users are talking of trying solid rubber tires on their pleasure vehicles. It is probable that next year will see quite a proportion of the cars owned by users who require only moderate speeds, equipped, at least experimentally, with solid tires upon the traction wheels, if not upon the steering wheels as well.

Apparently one reason for this movement among automobilists who regard the motor car as a vehicle of utility, lies in the fact that among the more conservative ones high speed has ceased to be the chief desideratum, and reliability in service has become their chief object. Speed legislation, acting in conjunction with a growing appreciation of the danger and the nervous strain inseparable from fast driving, has led a large body of automobilists to confine themselves to speed rates well within the safe and comfortable limits of the solid tire. The owners who are contemplating the use of solid tires do not appear to be making the change, so much with the expectation of reduced tire cost as with the one controlling idea of securing substantial reliability in this part of the vehicle. Solid or semi-solid tires, while they may wear out and be subject to cutting and loosening from the rim, are not prone to suddenly and utterly fail and may generally be depended upon to give ample notice of the termination of their periods of service. As a great deal of attention has recently been paid to the load supporting springs or motor cars and special engine carrying springs have been adopted in not a few cases, the substitution of solid or semi-solid tires for moderate speed work will probably result in no marked discomfort to passengers, or any rapid deterioration of the motive power. The successful use of these less resilient tires upon motor delivery wagons has evidently paved the way for their extensive adoption upon pleasure vehicles.

A Much Postponed California Event.

Much ink has been spilled the past summer over an endurance contest which it was proposed to hold between San Francisco and Los Angeles, Cal. It appears that the promoters of the event were the dealers of the two cities, but that private owners were counted upon largely to make it a success. Evidently these refused to "play," probably doubting their ability to enjoy an organized run of long daily trips over the rather poor roads between the two cities, with prospects of its developing into a race. The original intention was to make the run both ways, but little encouragement being received in Los Angeles, the return part was abandoned. But even this did not bring the expected entries, and when the date fixed for the event approached, it had to be postponed. Since then the date has been postponed several times more, and in all probability the event has now been entirely abandoned.

The occurrence only furnishes another proof that private automobilists are no longer inclined to take part in organized road runs for the good of the trade, a fact which would-be organizers of endurance contests should bear in mind.

Engine Starting Safety Devices.

Newspapers frequently contain accounts of accidents to automobile drivers from the 'kicking back of their engines in starting, showing that in spite of the fact that manufacturers are now always very careful to impress upon their customers the importance of setting back the spark lever before cranking the engine, by oral instructions as well as in their instruction books, there are always a certain number of careless or reckless persons who disregard this precaution. The fact that two of the more prominent runabout manufacturers this year fit their cars with a safety device making it impossible to apply the starting crank before the spark is set back, may be regarded as further evidence of frequent mishaps of this nature. It seems, indeed, that the growing familiarity of the public with the automobile breeds public contempt for its dangers, and that as a result accidents frequently occur which should be impossible if the operator used ordinary prudence. Breaking or spraining a wrist by trying to start a motor with spark advanced is the most familiar example. The general use of *safety starting devices is, therefore,* to be recommended, particularly for large cylinder engines, on account of the great force of the individual explosions. The arrangement is simple, light, unobtrusive and inexpensive, and the guaranty of safety it insures fully warrants its cost.

Running Over Dogs.

We notice that in England a National Canine Defense League has been organized to prevent "the reckless and ruthless murder of dogs by motorists." From some literature issued by the league, and comment thereon by sympathizers in the press, it appears that these gentlemen are under the impression that some motorists make it a rule to aim their cars at dogs with the object of running them down and perhaps killing them. The supposition is a very naïve one, reflecting utter ignorance of automobile matters. Stray dogs on the highways are more or less of a danger to the automobilist pursuing a steady course, but if any driver should try to guide his car in accordance with the swift and erratic movements of a dog crossing the road, there would be as much chance of an accident to the car and its occupants as to the dog. An accident to a dog implies a fairly high speed of the car, and if a fast-moving car is steered erratically, there is much danger of side-slipping with all its dire consequences.

A driver can only be blamed for killing a dog if it can be shown that he drove unreasonably fast. No sane driver will try to guide his car to run over any animal, and no driver can be expected to jeopardize his own life to save that of a dog. Many serious accidents have been caused by cars running over large dogs, and to motor cyclists there is no greater danger, several having been thrown from their wheels and killed by encounters with canines. Automobiles are less exposed to serious accident from this cause now than formerly, because with the irreversible steering gears now universally fitted, the steering device is not wrenched from the driver's hands when an obstruction is met.

Some Causes of Skidding.

The tendency of automobiles to turn end for end under certain conditions is still regarded as a mystery by many persons, but gradually the obscure causes of this phenomenon are being elucidated. The effect of the gyratory action of the engine flywheel and road wheels, in conjunction with unevenness of road surface, has been referred to repeatedly in these columns. Another cause is obstructions met by one of the front wheels, whereby the center of resistance to motion is shifted out of line with the center of the propelling force. The result is that the car tends to turn around the obstruction as on a pivotal point.

These two are obviously the chief fundamental causes of skidding. What is surprising is that they should produce such unexpectedly powerful effects. Everyone knows that to slide a vehicle at rest sideways requires many times greater effort than to move it straight ahead or back—probably ten times as great—and the two causes mentioned seem incapable of such prodigious effects.

A partial explanation of the anomaly is furnished by two Englishmen, whose paper, read before the British Association for the Advancement of Science, we reproduce in another part of this issue. It is known that the tendency to skid is particularly great when the brakes are applied suddenly and the wheels are locked. In that case the wheels can only slide over the ground, and if the road surface is smooth and level the resistance to motion is about the same in every direction. The great force required to move a car under such conditions is derived from the momentum stored up in it, and it requires only a comparatively slight cause, such as a sloping of the road surface, for instance, or any obstruction encountered by one of the steering wheels, to cause skidding. The brakes should, therefore, never be jammed on suddenly, unless absolutely required, and the brake lever should always be kept well in hand so as to be released immediately if skidding occurs.

The authors of the above-mentioned paper also suggest a preventive against skidding, which consists in making the front wheels the drivers. Experiments with a model on a greasy inclined plane showed them that if the front wheels were locked while the model was running down the incline, its course would not be affected, while if the hind wheels were locked, it would invariably perform a pirouette. That front wheel driving presents advantages in this respect has been known for a considerable time, but the development of the automobile seems to have proceeded entirely on the basis that rear driving is the correct princi-

/e know of no direct inherent advan- ı rear driving, only an indirect one— is easier to drive the wheels which t used for steering, while there is a ε advantage in front steering. With types of cars no mechanical difficul- ould be met in making the front the drivers, but a front driving ar- ıent and brakes on the front wheels probably for some time offend the customed to the reverse order of

ı the predilection of inventors for ng the usual arrangement of parts in iical devices, it is surprising that so .ve adopted the front drive, but the ıtion is no doubt found in the fact e advantage of front steering is en- obvious and frequently brought into while the advantage of front driving generally understood and becomes only on comparatively rare occasions, may be regarded as accidental.

ssed Air as an Auxiliary for Automobiles.

By N. B. Pope.

rience in the construction and opera- large power plants has taught the mportance of the auxiliaries, or ma- which have to do with the output of only in a secondary way. The en- devotes quite as much care and t to the development of the con- , pumps, purifiers, economizers, as main details of engines and boilers. horseless vehicle, though developing , is still crude when considered in ıt of other engineering work. One rawback seems to lie in the general stencies of design. The different lo not seem intended to work to- harmoniously.

devices for circulating jacket water, fuel to carburetors and burners and ing engines and transmission gear- y be classified among the auxiliaries utomobile. As the function of these s, in a way, secondary, many de- are content to assign them locations are more convenient than advan- . The tendency seems to be to he product of some "parts manufac- rather than to use an article de- for the particular place in which it e used. This may be of advantage maker from an economic point of nd often insures better satisfaction buyer. But the result, particularly ble in American machines, detracts ıe general uniformity of the product, netimes results in unsatisfactory or action of poorly adapted parts. A unification of design and operation ıe very important adjuncts, and a simplification of operation and control is much to be desired.

Many of this year's touring cars, copying the Mercedes, use some form of pressure feed carburetor. Steam cars universally use a pneumatic head for feeding their burners. Several of the multi-feed lubricators on the market depend directly on air pressure for their action. The "air-line" control of one machine is too well known to need more particular mention. A car shown at the Garden in 1903 had pneumatically operated clutches, and at least one machine of this year's vintage has a braking similar to the "direct air" used by many railroads.

Pressure feeds, as commonly used, obtain their supply variously from pressure tanks filled by hand pumps, from motor driven air pumps, from the engine exhaust, and, in the case of certain lubricators, from fluid pumps forcing against a pressure head. In either case compressed air drawn from a continuous supply at constant pressure, such as could be automatically maintained in a storage tank, would be of evident advantage.

Besides the uses already mentioned, a construction for pumping tires on the road, cleaning about the motor and car, and so on, would be of advantage. Large stationary gas engines are started by air almost universally, and its use for that purpose on automobiles is heralded by the makers of a new car recently described to the public. Here are no less than seven possible uses of compressed air on a gasoline machine, not to mention the delight of a chime whistle, and five on a steam car.

Hence the idea readily presents itself of using a common supply and a distributing system for doing the auxiliary work, instead of having the usual complexity of chain or belt driven pumps and their appurtenances. This has been done by the designers of the machine mentioned as having air brakes.

An auxiliary air system of this sort would consist of a compressor, storage tank and pipe line from which supplies could be drawn in proper amount as needed. The compressor might be driven in either of three ways—continuously from the motor, excess pressure being relieved by a safety valve; intermittently from some remaining part of the car itself, as for instance, the rear axle; or intermittently from the motor by a clutch, and operated only when the main supply is being drawn upon. Each method would have its advantages and disadvantages. To find suitable location for the compressor would be easier than to place the tank where it would be unobtrusive. The pipe line would work itself out without much difficulty.

Considering the advantages of such a system, it is probable that the importance of the compressor would become so great that it would receive the particular attention of the builder, and would have, in consequence, a substantiality not usually granted parts serving the same purpose individually. The required capacity would be sufficiently great so that cheap or flimsy construction would be out of the question. There may be a doubt as to whether or not the number of actual moving parts would be reduced, but the increased simplicity of the individual apparatus and ease of control would be marked. The advantage of continuous pressure feed over that depending on the engine speed for its intensity has been referred to. This may be qualified in the case of the lubricator, as many of the types in present use take advantage of the varying pressure to feed in proportion to the demand. But this is not a necessary feature, although it constitutes a pleasing little refinement for use as a "talking point" by agents.

To introduce such a system on runabouts or other light cars is, of course, out of the question. In fact it would be unnecessary and superfluous for any but the heavier forms of touring car. For them, however, it would insure a better uniformity of constructive detail and more satisfactory operation. The various parts would become less independent and more co-operative than is apt to be the case at present, for the average automobile seems more like an assemblage of independent mechanisms and more or less rudely developed ideas than a machine, designed, as a whole, to perform a specific duty.

With the passage of the touring car craze will come an epoch of machines for both commercial and pleasure uses in which many of the features of the present common types will undoubtedly be retained. But these machines will be required to do their work with the unflinching regularity and certainty of operation now expected of a trolley car. What is now a desideratum in a purely pleasure vehicle, will become an absolute necessity then. Roadside delays will be intolerable, and continuous smooth running essential; for the trackless car will be in competition with the railroad. The demand for better detail work in design and construction will bring about a development of the larger class of machines in which compressed air is likely to serve an important part as an auxiliary.

The Care of Clutches.

By Julian C. Chase.

It is impossible to emphasize too strongly the fact that the breakage of parts, the wear and tear of the car as a whole, and its consequent general depreciation, are due in a much larger measure to the sudden shocks to which the vital parts are subjected than to the natural wear resulting from the constant transmission of driving power from the engine to the tires. The shocks of sudden braking severely tax the running-gear construction, but the shocks of improper clutching affect also the power mechanism

and are, therefore, of even more serious consequence.

Defects or disarrangements in clutches reveal themselves in two different ways—either by gripping or seizing of the clutch, or by what may be called "spinning." Clutch defects may be classed accordingly, as the two phenomena are due to entirely different causes and affect the transmission gear differently.

When the clutch "grips," it is impossible to engage it gradually; the power is therefore applied suddenly, and a blow delivered to all parts along the line of transmission. In the majority of cases, poorly designed controlling mechanism is responsible for this condition of affairs. It should be possible to permit the clutch to engage very gradually, so that it slips at first, and grips tighter as the car accelerates. To do this, it is necessary that there be a liberal amount of movement of the foot pedal or operating lever, so that a considerable amount of time, comparatively speaking, is occupied in making the engagement, and at the same time a sufficient leverage secured to make the physical effort required small and therefore more steadily applied. There should be no looseness in the joints, nor any "give" or springing, either in the levers or at the fulcrums, for as the amount of movement between the engaging surfaces is necessarily small, it is essential that the means of abtaining it be absolutely positive.

With a perfect operating mechanism it is possible to engage a clutch easily and without gripping, no matter what the tension on the spring may be, within, of course, certain reasonable limits. However, not all controlling devices are perfect, and it may, therefore, happen that excessive spring tension causes a clutch to grip, while a tension just sufficient to meet the normal demands of driving could be easily controlled and would permit gradual engagement of the frictional surfaces.

In this connection it may be said that the proper tension on the clutch spring should be made the subject of careful study. Too great a tension may not only lead to the trouble indicated above, but will also cause excessive wear on the thrust bearings and on all parts of the controlling mechanism. The clutch should act as a safety device, to an extent. It should, of course, be capable of transmitting sufficient torque to drive the car up the steepest hill, which the power of the engine will enable it to climb, yet it should slip when a heavier shock is delivered to it, and thereby prevent this shock from reaching the breakable parts of the transmission. Generally speaking, a sufficient spring tension is that which will permit the clutch to slip very slightly when the car is climbing a grade which taxes the engine to its limit when the highest speed is in use.

Gripping may also be caused by an improper condition of the engaging surfaces. If they are both metal surfaces, the lack of *sufficient oil between them may prevent the* slipping necessary to effect an easy start. It would also tend to aggravate the gripping by roughing up the surfaces. If leather and metal are employed, the cause of the trouble usually is that the leather has become dry and rough through lack of care. Water and gasoline should not be allowed to reach it, as they help to dry out the oil held in its pores. Gasoline will accomplish this very quickly, while water may have just as bad an effect in the end, although it does not act so rapidly. The heat generated as one surface slips over the other also tends to dry out the oil, and if a car has been operated for some time with a slipping clutch, a careful inspection of the surface of the leather should be made to ascertain whether the heating has dried it up to any extent. If this is not done, the clutch may grip when the spring is tightened.

There are a number of different recipes for clutch leather dressing which are recommended by motorists of experience, but castor oil is most generally used, sometimes mixed with equal parts of glycerine. In either case it should be applied in limited quantities. Machine oil should never be used, as it is not so readily taken up by the leather, and will allow slipping under a higher spring pressure than is necessary if the surfaces are in perfect condition.

In applying the dressing, it is better to use a small brush or swab, as if it is poured on, it is not likely that it will distribute evenly, and as a result some portions of the leather will receive too much and others not enough. The driving effort should be distributed evenly around the periphery of the clutch, which can only be the case if the engaging surfaces are uniform at all points.

Spinning, as we have called it, is the continued revolution of the driven member after it has been disengaged. It results in a series of sharp, hammer-like blows to the gears (if of the sliding type) as they are brought into engagement, which tends to chip and burr the teeth, and, what is a less serious matter, to create considerable noise.

Spinning may be caused by faulty design, defects in construction, or by improper adjustment. In some cone clutches the rim of the driven member is very heavy and of considerable inertia, and when disengaged continues to revolve much longer than is desirable. In this case the part of the operating mechanism which bears directly against it should be so designed that it acts as a brake and retards the revolving part when the latter is disconnected.

Another cause of "spinning" is failure to cut the driving power off entirely, either through lack of sufficient movement between the surfaces to permit them to clear each other, lack of proper lubrication, too tight a bearing or bending of the clutch shaft, which causes binding between the two members. It is well to note carefully the action of the driven member when suddenly withdrawn from the driving member while the engine is running at a fair rate of speed and no gears are in mesh. It it is in perfect condition, it will stop almost instantly. If it does not stop, a careful investigation should be made to learn the reason. Upon the free action of the clutch, more than upon any other thing, depends the successful operation of a good slide gear transmission.

Slipping of the clutch may result from either of two common causes. The first is insufficient spring tension, and the second greasy surfaces. The remedy for the first is obvious. The second is only possible with leather clutches, and the remedy lies in getting rid of the superfluous oil. To do this it is best to use French chalk or talc. It can be blown into the space between the two clutch members by means of a glass tube, and will absorb the oil rapidly. Gasoline or resin should never be used, as the former dries up the leather, and the latter imbeds itself into the surface and may ruin it.

Before concluding that a clutch spring needs tightening or that some of the oil should be removed from the leather, it is well to ascertain whether the slipping is not due to the fact that some part of the transmission is binding, as this might be the real cause of the trouble and the slipping of the clutch merely one of the results.

As to Dimensions of Springs.

Complaints as to the supposed carrying capacity of springs are frequent. Without doubt, their deficiencies can easily be traced. In many cases the grade of steel is not what it ought to be, and the supposed carrying capacity is not in the springs. Those experienced in the suspension of carriages and wagons generally agree that the straighter the spring the easier it works. But springs are cambered or are "open," so that the greatest possible load or down pressure shall not deflect the plates beyond the horizontal line. Hence, the camber or opening must always be greater than the greatest deflection for the load they are intended to carry.

There are three ways of increasing the flexibility of springs—by increasing the length, by decreasing the opening and by reducing the width and thickness of plates. These facts are well known to every carriage and wagon builder, but there seems to be a great deal of uncertainty as to the correct results arising from either change. Experience alone has taught those connected with this part of carriage and wagon building what the dimensions should be for a certain load. If conditions vary by changing the load from either of the front or back wheels, or by increase of weight in either direction, mistakes relative to its carrying capacity are likely to result.

The main plates on all springs should be always of a heavier grade of steel, being packed by lighter or reduced grades. This strengthens the carrying capacity, improves elasticity and prevents to a greater extent the matter of fractures from collapse or recoil.—*Carriage Monthly.*

LESSONS *of* THE ROAD

A Change of Heart.

By Dr. Charles A. Dennett.

the Doctors' number of the Horseless I wrote an article on the use of a ı automobile in my practice, and stated eason for it being superior to a horse a physician's standpoint. For about a I have been using a gasoline runabout. : find it as much superior to steam as ı is to a horse. Since using gasoline 'e had inquiries from all directions as ıy this change of heart, so "I rise to in."

steamer was a great success com- with horses—saved much time, was er, mile per mile, and infinitely more ırable. Still, there was always ething doing" in a steamer. You had atch the water indicator, the steam :, gasoline gauge and the water in the and on account of the many working a great deal of tinkering had to be You can never get a steamer ready ight before and be sure that it will go e morning without more tinkering or tment of some kind. Still, when I ased my steamer, several years ago, gasoline cars were not perfected as are to-day. Gasoline cars have been improved; steam is about where it Steamers seem to catch the begin- Take a steamer in the pink of con- , just from the factory, with a dem- ıtor who knows his business—it is ess, vibrationless, swift, and certainly go fine. It appeals to the uninitiated. er making a study of the cars at the York and Boston shows, and visiting ıl factories, I bought a runabout, air- l, 8 h. p., weighing a little more than lbs. It is far from an ideal car, in udgment, but it has done me good e, and after a year's hard use is in ondition. There are three things to ımend this car above many others: exceedingly simple, sure to go, and strongly built. It seems unnecessarily ; in many parts. It has never failed , and has always taken me there and ht me back—essentials in a car for a ian.

: first severe trial given this car was r from my home in Greater Boston cottage at Sebago Lake, Me., from to Bridgton, Me., and return via ebunk Port. We left home one after- last August and rode to Portsmouth ynn, Salem and Newburyport. The were good all the way to Portsmouth, y odd miles. It is a much pleasanter nore interesting ride to go over the uryport turnpike, and the road is as ht as the crow flies, but it is quite hilly, and the road is poor. In order to avoid the cities and the trolley cars, which I detest, I prefer to go this way. Leaving Portsmouth, you leave good roads also, and no matter which way you go, through Biddeford and Saco, or through the Berwicks, before you get half-way there you will wish you had gone the other way. After going over the road many times, we prefer the road to Saco, then up the Buxton road to Buxton Center, from there to Standish Corner, and so to Sebago Lake. There is not a bad hill along this route.

There is still another way which I have tried twice this season, and like the best of all. This is to go from Boston over the Newburyport turnpike, and from Newburyport via Dover to Somersworth, N. H. The roads are good all the way to Somersworth. Then go to Sanford, and don't fail to stop for dinner at Sanford, where there is to be had a typical fine country tavern dinner, everything neat, and agreeable people in charge, even to the waitress. The roads are bad in Sanford and all the way to Alfred. From Alfred it is nearly a straight road to Bonnyeagle across the Hollis Plains; it is very sandy, but it is a relief to go on in the narrow, rutty road. The machine does not seem to make much of a fuss about it. We go through Center Waterboro on the way, and after Bonny Eagle go to Standish Corner and on to Sebago Lake. This is a delightful ride, interesting scenery most of the way.

My cottage is two miles from the main road, and one and a half miles through the deep woods. Part of the way I made the road myself, five years ago. Still, we had no trouble except the trouble with tires. From East Sebago to Bridgton there are many hills that are hills, but the machine never faltered. The scenery is magnificent, and the air beyond description. From the ridge above Highland Lake, what a grand view of the White Mountains! You will be glad you are living if you ever go there, and if you ever have been, you will go again. We stopped on the ridge for dinner and returned to the cottage for the night. The next day and a half we stayed on that lake, which is the home of the land-locked salmon, Sebago.

When we started for home the next day it was raining hard, and we decided to go to the Old Fort Inn at Kennebunkport for the night. Here was a good test for the automobile—country roads in Maine during a hard storm. Did you ever ride from Kennebunkport to Sebago by auto during a rain? If you have, comment is unnecessary. We arrived safely and found that the hotel had no livery connected with it, but were referred to a stable about a third of a mile away, where the landlord said we might get our machine housed. But the stable keeper looked at us, all drenched with rain, and asked how long we were going to stay? We told him at least over night, whereupon he told us his stable was full of horses and carriages, and that there was no room for autos. So we came to the conclusion that he was suffering from that disease called cerebro-anserinus-agenesis, which, translated, means, the rooted aversion of mankind to the advancement of new ideas. As we were more independent than diplomatic, we returned to the hotel, ran the machine to the rear of it, protected it as well as we could with top and boot, and let it rain. The next morning the engine started at the first turn, and off we were for Boston at about 10 o'clock a. m.

Talk about roads! Do you remember that clay road a few miles out of Portsmouth? As we were going through the worst of it, sticky, slippery clay way up to the hubs, we met a farmer who said, "This is the worst piece of road God ever let man build, but have courage, when you get to Portsmouth it will be better." We did get to Portsmouth, and so on to Arlington, arriving at about 8 o'clock. We had been gone about five days, traveled 345 miles, and this without a minute spent on the machine except to oil it. The only adjustment I made was the tightening of a bolt on the high speed clutch, which took only a few seconds. The engine never missed an explosion in all the journey, and the next day was "fit as a fiddle," without any of the tinkering which would have been inevitable with a steamer. It had to be washed, however, and my man said it would take a dozen washings to get it clean.

I think this a good record. Still, there are a good many things about the machine I do not like. It is too heavy for a runabout; the wheels are too small; I do not believe in side springs, and the wheel base is too short. It should have more horse power—16 would be none too much—then you could go fast up hills. We are far from the ideal car, but the improvements in the last year have been wonderful. I think most cars have too little horse power. You often use every bit of power on a slight grade or level road, and when you come to a hill have nothing in reserve, and have to go on low speed. I like to ride fast and go up hill fast, but it cannot be done with my machine. But on the whole it has given and is giving good service, and I should advise no physician to get a steamer if he can get a good gasoline car. One great argument in favor of a gasoline car is that it is always ready, day or night. One turn of the crank and you are off. For night work it is ideal.

The worst of all my troubles is with the tires. I have run this car about 7,000 miles, and I have one tire in my fifth set, and when each tire costs complete $37.50, the expense is so great as to be almost prohibitive. All tires are bad, some worse than others. This year the manufacturers said the tires would last a whole season, and told how much thicker and stronger

they were making them. The season is too young yet to tell, but I don't believe they are much better than last year.

My gasoline car uses about two-thirds as much gasoline as the steamer, notwithstanding that it weighs twice as much. Over a smooth road I have gone twenty miles on one gallon Over country roads I find fifteen miles an hour a comfortable speed—i. e., to cover fifteen miles in one hour you have at times to go at the rate of twenty miles, and at other times at eight or ten miles an hour. The shortest way from my house to my cottage is 125 miles. The best time I have ever made is nine hours. This includes stopping for dinner and other delays necessary on a long run. I have never tried to make a record.

Suggestions to the Novice.

By H. S. Wheeler.

There is no use denying it, we all have the "larger car" fever, and are determined that next year we will purchase a machine of greater power. In view of this fact it would seem that a few suggestions given as a sort of "side talk" might prevent some of the embarrassments which the operator of a new car is always likely to have. These suggestions, while intended primarily for the single cylinder runabout class, may prove of some interest also to the graduate from the two-cylinder class.

What car you buy is none of my business, and if I should advise you, you would kindly thank me, go and buy the car you want, and be certain of pleasing—yourself. There are more good cars than poor ones manufactured in the United States, but remember that a poor car well taken care of and run intelligently, will give more satisfactory service than the best car built, if it is handled by a man who knows only what pedal to push down and which lever to pull. You all know, to your sorrow, the effect an incompetent horse driver has on his horse—and your temper.

If you can so arrange it, go to the factory and spend a few days watching the assembling, adjusting and testing of cars similar to yours. Take a hand in the work yourself, and don't be bashful, but ask questions. The machinists may not like you for it, but you may learn a kink or two it would take a week to find out by yourself. In a day or two the men in the shop will tell you that you understand the car perfectly, and you will believe it—but don't fool yourself. You don't know a thing about the car yet.

If you cannot go to the factory, get all the literature published which concerns your own particular car and study it. You can learn a good deal about the car either way, but to "know" it you must run the car over a couple of thousand miles of poor roads, have your troubles, and overcome them.

When your car arrives, get it into the barn and go into secret session with it. Get out your instruction book and find what things are for, and how they accomplish their object. Beware of going at the car, though, with a screwdriver and a monkey wrench—to see "what makes the wheels go 'round." You will have to use that wrench and screwdriver later on, so there is no need of getting too familiar with them at the start.

A multiple cylinder engine runs the same as a single cylinder one, but contains several of each of the individual parts instead of one only. Look over the wiring and coils and find out why you get a spark in each cylinder when you do. Look over the lubricating system and find all of the oil holes, and remember this—that it is cheaper to buy gas engine oil than to have the cylinders rebored, cams replaced and bearings rebabbitted. It might be well to notice, too, that you always want to use the car when it is in the shop. Moral: Keep the car in shape and it won't have to go to the shop.

You will probably graduate from planetary transmissions. Throwing in the clutch and shifting gears in the sliding pinion system requires experience. Remember not to throw in a higher gear until your engine is up to speed, nor to throw in a lower gear until the car is slowed down sufficiently to make the change practicable. The correct time to change gears is a thing learned only by actual experience, but when once learned the operation becomes almost automatic. By the way, heavy cylinder oil and flake graphite are good to use in gear cases. In changing gears, learn to judge the ratio of engine speed to car speed for the various gearings, so you can drop in your clutch at the proper moment to avoid the sudden jerk which accompanies the dropping in of a clutch either too soon or too late, and is often the means by which gears are stripped.

If the drive is by chain or shaft, find out the correct adjustment of same and be particular to always keep the adjustment.

A too loose chain starts the car with a jerk; a too tight one creaks, and both strain the chain enormously and consume extra power. In a shaft-driven car the bevel gears must be meshed properly and the universal joints looked after to prevent liability of breakage and power loss.

Nothing is more common nor more easily gotten rid of than rattling and squeaking in the running gear and body fastenings. Take a little care and tighten things up once in a while. Graphite between spring leaves will overcome a few squeaks, and a little oil on the spring hanger bearings, together with tight bolts, will overcome the rest of them.

All pneumatic tires are much the same. Keep them pumped up hard, and if you get a puncture on the road, fix it, as an hour's work on a tire fixing a puncture is invariably less expensive than riding the tire in flat. You can learn how to take out a tube, patch it, and put it in again from any repair man in an hour or so. It is a job that must be done right, too.

Motor cars are of two kinds, those which are well taken care of, and those which take care of themselves. You can always tell which is which as they go along the road, making their respective noises. Each of them has a personality which is a reflection to the owner showing in his car. It's for you to determine how your car shall reflect your personality to the always curious and gossiping public.

Patent Commissioner's Annual Report.

The annual report of the Commissioner of Patents for the year 1903 has just been issued. During the year there were received 49,289 applications for mechanical patents, 770 applications for design patents, 154 applications for reissues of patents and 2,504 applications for registration of trademarks. There were 31,582 patents issued, including designs, 117 patents reissued, 2,186 trade-marks registered. The number of patents that expired was 21,797. The total expenditures were 1,448,645.81. The receipts over expenditures were $193,556. The total balance to the credit of the Patent Office in the Treasury of the United States on January 1, 1904, was $5,682,540.61.

In proportion to population more patents were issued to citizens of Connecticut than to those of any other State—one to every 996. Next in order are the following: District of Columbia, 1 to every 1,063; Rhode Island, 1 to every 1,224; Colorado, 1 to every 1,335; Massachusetts, 1 to every 1,348; California, 1 to every 1,516; New Jersey, 1 to every 1,533; New York, 1 to every 1,589; Illinois, 1 to every 1,715; Ohio, 1 to every 1,928; Pennsylvania, 1 to every 2,004. As to foreign patents, 1,065 were granted to residents of England; 1,053 to those of Germany; 440 to those of Canada; 321 to those of France; 136 to those of Austria-Hungary.

The conditions of the examining divisions upon December 31 is indicated by the fact that of the 38 divisions 23 were then taking up new cases for action within one month from the date of filing, and the remaining 15 were in arrears between one and two months. The total number of cases awaiting action on the part of the office upon December 31 was 10,423. The business transacted by the Patent Office during the calendar year 1903 exceeded all previous records.

The Commissioner concludes his report by saying that "at the present time the space provided for the Patent Office is inadequate, and it is very desirable that some plan looking to an extension of working room for the Patent Office shall be adopted without delay, since the present space will be insupportably crowded at the present rate of increase before any new building could be built to contain this office."

TOURING ROUTES

A Three Day Trip in Eastern Michigan.

By W. J. Moore.

In August last the writer and party made a three days' automobile trip of some 370 miles in the State of Michigan, starting from Caro, in that State, going by way of Pontiac and Detroit to Ypsilanti, and returning by way of Detroit, Mount Clemens and Port Huron. On the trip down I was accompanied by my wife and brother, and at Ypsilanti we were joined by my sister and a friend, Miss Whitely.

We started from Caro on Thursday morning, August 4, with the antomobile in prime condition and the air very bracing; and while the machine is doing its fifth season's duty it never seemed to run as nicely as it did that morning. It was not our object to go as fast as we could, but rather to go at a moderate speed and have a trip of pleasure. We reached Mayville at 6:30, and started for Lapeer by way of Fostoria and Columbiaville. About four miles beyond Fostoria we made a mistake in roads, and got on what is known as the old sand road. We found the sand here very bad indeed; so bad, in fact, in some places that all hands had to get out and walk in order to get the machine to go through. This manoeuvering put us back considerably. We took breakfast in Lapeer and went on through Hunter's Creek, but before reaching Metamora a burr in the transmission came loose and allowed a coupling to loosen. This delayed us perhaps three-fourths of an hour.

I never traveled over as many hills as I did from Lapeer to Oxford. It seemed as though it was all hills, and I would not call this section of the country a desirable farming country. But after passing Orio the country is better.

We reached Pontiac at 12:45. Had expected to take our dinner in Pontiac, but our party voted to picnic for dinner, and we therefore went about ten miles beyond Pontiac, where we found an elegant place to picnic, nearly directly across the road from the Detroit Automobile Club House. After completing our meal and taking a picture of the scene, which caused a delay of about one hour, we started for Detroit. We arrived in Detroit at 3 o'clock. The road from Pontiac to Detroit is the finest I ever passed over, and the country compares favorably with the roads; an electric railway line and a steam railroad line parallel the road a good portion of the distance. We only stopped in Detroit long enough to add some gasoline to our supply. This was not necessary, as we had three gallons, but we thought it would be more handy to replenish our supply there than elsewhere.

From Detroit to Wayne the wind and the loose condition of the road surface caused

Luncheon in the Park.

a great deal of dust to be raised, and during this part of our trip one very objectionable feature of automobiling made itself strongly felt. My brother, who occupied the rear seat, was literally covered with dust, and his appearance caused a great deal of laughter by our party and others as well. We passed through Wayne at 4:30 and reached Ypsilanti easily at 6 o'clock; distanced traveled, 140 miles We could have made the whole trip a great deal faster, of course, but, as stated, this was not our aim. My sister and friends at Ypsilanti were out to meet us in full force. That evening plans were finally made that my sister, Miss Whitely. my brother and myself would return by automobile to Detroit and Mrs. Moore would go that far by electric car. It was also understood that on the return trip we would picnic for dinners and perhaps suppers, provided we could find suitable places, while we would breakfast at the hotels. We started from Ypsilanti on the following day at about 10:30, with four suit cases and other baggage weighing over 200 pounds, and four persons aboard.

Thinking the electric car would make better time than we did, Mrs. Moore was to start 15 minutes after our departure, and we expected that she could pass us on the road and note our progress. Coming from Ypsilanti to Detroit, a distance of 30 miles, we thought we would give her a race any way, and therefore turned on full speed whenever the road would permit. We kept close watch behind after getting out of Ypsilanti 10 or 12 miles, but looked in vain, as the car failed to overtake us. We reached Detroit in just one hour and twenty minutes after leaving Ypsilanti, and waited in Detroit just thirty minutes before the arrival of Mrs. Moore, whom we surprised by meeting at the car door.

We took our picnic dinner on Belle Isle, which we found a most agreeable place for the purpose. After taking some photos, at 4:30 we left for Mt. Clemens over the shore road. After getting out of Detroit four or five miles, the next ten miles is a most beautiful drive along the shore, as level as a floor, with large, handsome summer homes on one side and the blue water dotted with craft on the other. The only thing to mar the perfection of this drive is the occasional notice to auto drivers not to exceed twenty miles per hour.

Everything went well until we got within about ten miles from Mt. Clemens. We were spinning along at a merry clip, with five persons aboard a car intended only for four, besides baggage amounting to more than 200 pounds, when we accidently struck a deep hole in the road, and at the same time heard something snap, and upon examination we found one leaf of our rear spring fractured. It was decided that it was unsafe to run in that condition, and, it being near supper time, we decided to have a picnic supper then and there, in the meantime considering what to do with the spring. A boy told us there was a blacksmith's shop about a half mile behind us, for which my brother at once started with the car, while the ladies prepared the repast. We found the blacksmith shop to be owned by a farmer, who said he was entirely incapable of repairing the spring, and, besides, he had no time. I then asked him if we could use the shop if we could repair it ourselves. He said that we were welcome to the shop, so we started to fix the spring ourselves. Inside of 1¼ hours we had the spring repaired. After we started to work at the spring, the man accommodatingly assisted us all he could, and said he had been under the impression that the drivers of these machines didn't know

much about actual repair work. He very flatteringly exclaimed that we were better blacksmiths than himself. After having the spring repaired, we returned to our party. A lady of a nearby house had very kindly offered them a teapot of hot tea with cream, which they accepted with many thanks. We spent three-quarters of an hour longer there, and then started for Mt. Clemens.

Arrived at Mt. Clemens at 10 o'clock. It was so agreeable riding by night, with our headlight showing everything as plain as day 100 feet ahead, that our party decided to travel farther. We, therefore, inquired of a stranger how far it was to Marine City. He claimed it was about 11 miles. Presuming that he was right, we started, thinking we would easily get there in three-quarters of an hour, and there secure hotel accommodation. We had a most enjoyable ride, and did not notice the time it took until we saw the city lights ahead. To our surprise we discovered we had traveled two hours, and knew therefore there had been some mistake, because it was impossible to use two hours to go 11 miles at the speed we were going, and thought we must be at Port Huron. However, we soon arrived on the streets of Marine City and drove up in front of one of the hotels at exactly 12 o'clock. After considerable pounding on the door we finally succeeded in getting the clerk out. We asked him how far it was to Mt. Clemens, and to our surprise he told us that the way we came we had traveled 30 miles instead of 11. He also told us that every room in his house was occupied, so we were obliged to proceed to another hotel, where we found good accommodations.

The next morning we left Marine City about 10.45 and traveled 15 miles, when we found an elegant place to picnic again. It was 3:30 when we left again, and we expected to reach home that night (Saturday). It was therefore decided that no more stops should be made. We had taken gasoline at Marine City, so there was no necessity for stopping except for supper, and we decided to eat our supper without stopping. We therefore passed along the river bank through St. Clair to Port Huron.

On entering Port Huron, we found the leading street was entirely torn up, and we had to drive on the sidewalk for nearly three blocks. The sidewalk was only about three inches wider than our car tread, and had we run off the same in places we would have taken a drop down a deep bank. It required therefore some careful driving. We could have avoided this walk only by going some two miles around. We passed through Port Huron without stopping, and on through Yale to Brown City. Here we lit our headlight, then continued our journey home through Marlette, arriving at 10:15, thus completing a most successful trip.

We did not put water in our machine from the time we started, and after reaching home, having traveled a distance of 371 miles by the odometer, we had used less than a gallon of water. The machine would, therefore, have easily made the trip again without replenishing the supply. The small amount of water used is remarkable, considering the overload we carried, and the fact that the machine is an old-time French car, purchased new five years ago. I am told there are hundreds of American machines made even to-day that require water every 25 miles. The gasoline used equaled one gallon per 23 miles.

We found people generally very much interested in our method of touring, and received only the kindest treatment from all we came in contact with.

Horses seemed to pay no attention to our car in country traversed by electric lines, but outside of this territory we frightened some. Drivers, as a rule, are glad of the opportunity of meeting autos in order that they may train their horses to them. It is very rare nowadays that you meet a horse driver who gets angry, provided you use the care that should be used, and those who do become abusive are usually hot-headed or half-witted persons that know no better. However, I consider it the duty of every driver of a car to be careful meeting horses, as they are, of course, very dangerous when much frightened. I feel proud of my record in this respect, as I have driven my car nearly 20,000 miles, and the first two years with no other car in this part of the State to help train horses, yet there has not been a runaway because of my careless driving.

The Kansas City A. C., after the failure of the meet announced for October 6, has decided to make another attempt on October 29, when it is hoped that some of the prominent drivers will be present.

BEGINNER'S PAGE

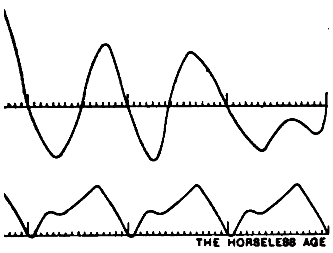
Four-Cylinder Gasoline Motors—I

In view of the fact that four-cylinder cars will predominate among the models of 1905, it may be of interest to discuss briefly the advantages and disadvantages of this type of motor, as compared with motors of fewer cylinders, and to describe its peculiar constructive features. Compared with a motor of fewer cylinders and of the same power, the four-cylinder motor presents the following advantageous features:

1. More uniform turning effort.
2. Less vibration.
3. Greater flexibility (range of speed).
4. Less weight.
5. Greater insurance against total failure.
6. Less noise.

In a four-cycle engine, only every fourth stroke of each piston being a power stroke, if only a single cylinder is used, there are naturally great variations in the rate at which power is transferred to the crank shaft. For instance, in a well-designed engine working with moderate compression, the maximum explosive pressure may be 300 lbs. per square inch, while the mean pressure during the power stroke will be only about 75 lbs. per square inch, corresponding to only 19 lbs. per square inch mean effective pressure for the entire cycle. The maximum pressure is therefore sixteen times as great as the mean effective. In an engine comprising four cylinders of the same size, the means pressure is naturally four times greater; and as the maximum is the same it follows that the proportion of maximum to mean pressure is here only four to one. The proportion of maximum crank effort or torque is about eight to one in a single cylinder, and two to one in a four-cyclinder motor.

Uniformity of turning effort is desirable for several reasons. The strains on the parts transmitting the power are proportional to the maximum turning effort, and these parts must therefore be made of a strength proportional to the maximum effort. For instance ,a crank-shaft for a single cylinder engine of a given horse power must have journals of much larger diameter than a shaft for a four-cylinder engine of the same horse power. The fly wheel, of course, evens out the turning effort, reducing the variations to a small per cent, at normal speed at least, and if a sufficiently large flywheel be used there would be no difference so far as the rest of the transmission members are concerned. In reality, however, the size of flywheel that can be used being limited, the fluctuations of torque are always greater in a single cylinder motor than in a four-cylin-



f Crank Effort of Single-Cylinder En-
e) and Four-Cylinder Engine (below)
e size.

r, and in consequence there are trains on the change speed gear, and the wheels and tires, as com- h a car employing a four-cylinder the same horse power.

ration is very much less in a four- engine than in a single cylinder. rmer the reciprocating and rotat- s are perfectly balanced, and the e of vibration is the torque re- hich is more than four times han in a single cylinder engine. be exactly four times smaller o engines ran at the same speed, he four-cylinder will run at a eed each charge fired in one of lers is less than one-quarter as a charge in the single cylinder. A der vertical motor mounted on e in front will, when throttled its lowest limit, produce no visible of the body when the car is sta- result which cannot be attained imilarly mounted single cylinder

eater flexibility of the four-cylin- r is a very valuable feature, as it e car to be operated largely on the avoiding the necessity of changing s frequently. Some of the best four-cylinder motors can be run he car at any speed between 200 revolutions per minute, while an powerful single cylinder motor rdly have a greater range of speed n 200 to 800 revolutions per min- r similar conditions.

to the fact that a four-cylinder quires only a very much lighter and crank-shaft than a single motor, it can be made considerably above a certain horse power. It rse, evident that for a very small y two or three horse power, the linder construction is the lightest, izes of motors suitable for touring four-cylinder is the lightest. An who has made a thorough study bject claims that from 7 h. p. on cylinder is the most advantageous ds weight, the one cylinder being antageous up to 2½ h. p., the two-cylinder up to 5, and the three-cylinder up to 7. In practice, however, the cylinders would hardly be made of less than 3½ inches in diameter and this would give the range for which the single cylinder is most advantageous as up to 3 1-3 h. p. double cylinder, 3 1-3 to 6 2-3, triple cylinder 6 2-3 to 10, and quadruple cylinder over 10.

With a four-cylinder engine, although, owing to the greater number of parts, there is greater liability of a derangement of some part, there is less danger of the car being rendered inoperative by the breakage of some part of the engine, as the failure of a valve, plug, etc., would only render one cylinder inoperative, and the journey could be continued on three cylinders, or even on two if need be.

While the best muffled single cylinder engines are practically as noiseless as the average four-cylinder, this result can only be obtained by introducing considerable back pressure. The exhaust from four-small cylinders can naturally be dealt with much more readily than the exhaust from one large cylinder. The separate puffs from a single cylinder motor are generally quite distinct, while in a four-cylinder they merge into each other, producing a practically continuous discharge blast.

The disadvantages of multi-cylinder construction are as follows:

1. Greater cost of construction.
2. Greater multiplicity of parts.
3. Greater fuel and current consumption.

For small power, say 10 to 12 horse, a four-cylinder engine is obviously much more expensive to build than a single cylinder, owing to the greater number of parts to be finished. A single cylinder crankshaft has only three journals to finish, while a four-cylinder crank has seven or nine. There are eight valves instead of two, four spark plugs instead of one, etc., while, on the other hand, only a single carburetor is required and a single source of ignition current, the same as in the single cylinder engine. Of course, all the parts of a four-cylinder engine are smaller, and are therefore less work to finish; and considering that it requires less material, it is claimed that above a certain horse power the four cylinder is less expensive to build than engines with fewer cylinders. Probably, though, the size above which the four-cylinder is the most economical to construct is beyond the power usually employed in touring cars.

Multiplicity of parts is certainly a disadvantage in one respect, viz., increased chances of a part to break or fail to work properly. For instance, with eight valves, the chances of one breaking or failing to lift or seat properly, are certainly considerably greater than with only two, though they may not be in actual proportion to the number. Any one of the four spark plugs in a four-cylinder engine is as liable to fail for some reason, as the solitary plug in a single cylinder engine. There is also greater liability of lubrication to some part failing in a four-cylinder engine, with so many more places to be lubricated.

A four-cylinder engine requires five to six times as many sparks in a given period as a single cylinder engine of the same power, hence also a proportionately greater amount of sparking current. This is of considerable moment if the current is supplied by a battery, but of no consequence if a mechanical generator is used. A four-cylinder is also less economical in gasoline consumption, as the greater wall surface of a small cylinder in proportion to its volume reduces the thermal efficiency, and there are also greater losses in mechanical friction. This difference in fuel economy is however of comparatively small importance.

In our next issue will be described the usual constructional features of four-cylinder engines.

Book Review.

Self-Propelled Vehicles, by James E. Homans, A. M. Second Revised Edition. Published by Theo. Audel & Co., 63 Fifth avenue, New York City.

In the new edition of this work, just out, there have been added descriptions of a number of American cars which have attained to prominence since the first edition appeared, and now nearly all the better-known American makes of cars are described at some length, and illustrated by means of half-tone cuts and line drawings of details. Descriptions of a number of cars which have become obsolete have been excluded, but still there remains a good deal of obsolete matter in the book. In descriptions of actual cars, a book publication can hardly be expected to be up-to-date, as designs change so frequently, but it is inexcusable to print illustrations of machines that have been discarded by the manufacturers years ago, or of devices which were put upon the market, but really never found any sale owing to lack of practicability. Some of the faults of the book in this respect may here be pointed out. On page 357 is shown an illustration of a Cannstadt-Daimler car built about 1898. It might be of some interest from an historical standpoint, but there is nothing to indicate that it is of such early construction, as it appears in a chapter on typical gasoline carriages, and the unsophisticated reader might take it for a modern machine. On page 198 is shown a double cylinder, horizontal-opposed engine which was brought out in 1900 or 1901, and discarded almost immediately after by the manufacturers.

As already stated, owing to the frequent changes in design, the writing of a book descriptive of the different actual cars on the market is a somewhat thankless task, as frequently the manufacture of a particular type of car may be discontinued before

the book issues. The underlying general principles, and general hints regarding care and maintenance is a more promising field for the book author. The volume under discussion contains a good deal of this kind of matter, but unfortunately it is not prepared with sufficient care, and many sections bear the imprint of having been copied more or less slavishly from earlier books, instead of being the result of original thought. For instance, in explaining the Otto cycle, a series of diagrammatic views are shown of an engine with three valves—a gas valve, an air valve and an exhaust valve. These are obviously taken from a work on gas engines. The proper thing to do would have been to show an engine with two valves, an inlet and an exhaust valve—the ordinary gasoline engine. We also notice that a cut on page 173, purporting to be a detail diagram of the valves and attachments of a gasoline engine cylinder, and which shows an entirely impossible arrangement of the inlet valve, as was pointed out in our review of the first edition, has not been corrected. Most of the cuts are rather poor, and serious imperfections are rather frequent. On page 169 is shown a diagrammatic section of a two-cycle engine in which the crank chamber end of the transfer passage is closed.

The book in spite of its faults contains a great deal of matter that should prove valuable and instructive to the automobile owner and driver, for which class it professes to be written; its chief weaknesses are that it also contains a great deal of matter for which the auto operator has no need, and that in developing the principles of steam and gasoline automobiles the literature of stationary gas engines and steam plants has been made use of to an unwarrantable degree. The cuts are mostly rather poor, but in so far as they are not absolutely inaccurate, this is excused by the low price of the book—$2.

Washington Diplomats as Motorists.

The implication of the Third Secretary of the British Legation in Washington in a speed case at Lenox, Mass., recently, has directed attention to the use of automobiles by the foreign diplomats in the national capital, and a timely article on the subject appears in a recent issue of the *Plain Dealer*, of Cleveland. It seems that although the wealthy Americans in Washington drive foreign machines, all the foreign diplomats use American cars; at least this was the conclusion reached by a photographer who called on most of the members of the colony. In view of the Lenox affair, constables and police justices in fashionable resorts frequented by foreign diplomats might do well to keep a list of those among the latter who indulge *in motoring pasted in* their hats, so as to avoid all possibilities of embarrassing international complications.

The pioneer diplomat-motorist of Washington was Ali Ferronkh Bey, late Ambassador of Turkey to the United States. He acquired ownership of a steam runabout of early model about four years ago, and took his lessons in driving at the deserted grounds around the Monument in the diplomatic section. At an early period in his career as an automobilist he managed to set his car on fire, with the result of some personal injury to himself and much damage to the car, and it is claimed that this unfortunate occurrence had a strong retarding effect on the spread of automobilism in the diplomatic colony.

The present Chinese Minister caught the automobile fever shortly after his arrival in Washington, and is operating a big touring car. The machine was pressed into service some time ago in entertaining a Chinese Prince who visited the embassy, and a good story on the Ambassador is told in connection with one of these trips. The car was being driven far out in the country, when suddenly the cooling water gave out. A search for water in the vicinity proved unsuccessful, and the prospects appeared to be that the royal Princes would have to be hauled ignominiously behind a mule team into Washington. Just then a milk wagon loomed up around a corner, and a deal was quickly made with the driver for a supply of milk with which to fill the water tank.

The Russian Embassy is said to be as auto-enthusiastic as any of the diplomatic establishments in Washington. Count Cassini, the Ambassador, drives a small runabout, while his niece and adopted daughter may often be seen driving touring cars through the streets of the city. Both are said to have attracted the attention of the District policemen by their speeding on more than one occasion, but no one has ever interfered, and the fair drivers enjoy the immunity of the diplomatic corps.

The latest convert to the ranks of diplomat-motorists in Washington is the Japanese Minister, Kogoro Takahira, who began with a gasoline touring car, but soon abandoned it for an electric runabout. He claims that the responsibility resulting from the war does not leave him sufficient time to indulge in extended tours, and he therefore confines his drives to the outskirts of the city, where he may be seen almost every afternoon.

While the members of the Chinese, Russian and Japanese legations use the auto as a means of recreation and convenient locomotion, the Austrian-Hungarian and the Peruvian Ministers have adopted automobiles for social purposes. Both own touring cars which may frequently be seen driven through the parks for an afternoon outing and carrying guests to afternoon teas.

COMMUNICATIONS

Concerning Speed Contests.

Editor HORSELESS AGE:

Your able editorial of October 5 relative to the Vanderbilt Cup race was so strong and to the point that the writer cannot forbear burdening your attention for a moment in telling you that it exactly expresses his personal ideas upon the subject, as well as the views of all automobilists with whom he has conversed. Your implied prediction that the race would result in some loss of life was a safe one, and has unfortunately been fulfilled. A little personal experience, which was probably shared by hundreds of other innocent automobilists, may not be without interest to you. Just as the yellow journals had circulated their sheets with the account of the race and the list of the killed, wounded and missing, the writer was returning from the garage after a peaceful country run with friends. Being somewhat known as a devotee of the "buzz wagon" he seemed to be a butt for automobile conversation. A friend remarked, "I see you fellows killed three people down on Long Island." While the writer did not feel intimately connected with the slaughter, he must admit that "the blush of shame mantled his brow" that he was connected, however remotely, with a movement which was concerned in such a debauch of foolhardiness as that referred to. Before the sanctuary of home was reached three other persons had offered remarks of a similar nature, and the writer had about decided to jack his machine up, take out the engine and set it to sawing wood in the back yard, use the body to grow potted plants in during the summer and go out of the business to save what was left of his reputation.

This anecdote simply serves to illustrate the fact that the general public holds the whole body of automobilists as *particeps criminis* in these murderous trials of speed. In its unreasoning rage at the excesses of the sporting element, the public allows its prejudice to fall upon the owner of every self-propelled conveyance. Whether it is the good doctor visiting his patients in his runabout or the business man who is giving his family an outing in his tonneau on Sunday afternoon, the stigma which should attach to a few motor-mad sports besmirches the multitude of sane owners whose motors have not affected their mental balance, to their very real and very great shame and detriment.

What reason can possibly actuate the mind of the manufacturer who creates the silly and ephemeral racing monster which is doomed to the scrap heap after a day or an hour of wild and useless flight? It cannot be that he is coolly and wantonly seeking to create a public feeling which shall result in

legislation involving legal restrictions rendering the advantageous use of automobiles of the highways practically out of the question. No; he is only bitten by the "speed bug," and may get over it before all his capital has been squandered on egg-shell racing creations. The writer, personally, if he were buying a machine, would "fight shy" of this manufacturer, whose engineering force have been wild eyed for months over their drawing boards seeking, and oftentimes in vain, to produce a car which should have exactly the opposite qualities and capabilities of the sensible car which the writer requires. His technical force have been studying day and night to build a car of minimum excess of strength and endurance. What is needed is a vehicle in which these qualities are at a maximum. He has turned his efforts to building a vehicle for the race course, while a study of ordinary road conditions is what is urgently demanded. His racer cannot be slowed down by any possibility to within the legal speed limit, while the average intelligent user wishes a car that cannot readily be speeded much above it, but will maintain a legal pace over hill and dale. But perhaps there is no use in complaining, for the "sport" has always been and probably always will be with us, and it may be that we ought to be thankful that he is only breaking machines and necks upon the ground in a somewhat restricted area and not holding motor air-ship races, as he doubtless soon will be. When he does take to the atmosphere we may all hope to have blasted out cyclone cellers to shield us from the detritus resulting from the annual Vanderfeller Cup race of that day.

Notasport.

The Question of Equipment.

Editor Horseless Age:

We have been very much interested in your discussion of the accessory equipment to be furnished by motor car builders, and we agree with you heartily that it would be a great deal better for the builders to confine themselves to their own special line and leave the purchaser to select his own equipment.

Our specialty is the lens mirror searchlight. We have tried for a number of years to induce the car builders to adopt the light, but without success. The whole trouble has been the price, and the contracts have always gone to makers of the cheapest line of reflector lamps or for cheap imitation searchlights fitted with bent glass mirrors instead of true lenses.

While we cannot sell anything to the manufacturer, we have had more than we can do to fill orders direct from customers, who, to use our searchlights, have had to throw away the cheap lights furnished with the car. We have lost a good many orders from owners who wanted the best lights, but could not afford to throw away the cheap lights that came with the car and for which they could obtain no allowance.

While many American manufacturers do their best to turn out the best work in engines, running gear, etc., they all go in for the cheapest trash offered in the way of spark coils, lamps, horns, etc.

During the past year most of our automobile equipment was sold directly at retail prices to the car owners who generally pay cash on delivery or enjoy excellent credit ratings and our losses from bad debts have been practically nil. If all accessory equipments were purchased by the car builders, prices would be very low and profits small and collections on the whole very uncertain.

The car builders have plenty of work ahead of them improving their own product, without dabbling in the equipment trade.

Rushmore Dynamo Works,
S. W. Rushmore.

A Peculiar Mishap.

Editor Horseless Age:

During a recent journey in my car from Chicago to Saginaw, Mich., I had an experience so unusual that I am tempted to relate it and challenge your readers to produce one more improbable.

We were running between Lansing and St. John (which, by the way, is a good stretch of road and one of the very few, I believe, in the State of Michigan) when, becoming uncertain as to which turn to take, we stopped at a school house to inquire. As I had noticed on former occasions that my companion generally got into a friendly controversy with the "school ma'am" on the subject of roads I concluded to give the motor a test. It is a two-cylinder vertical motor with automatically operated inlet valves. When stopped it was working perfectly. Upon my friend's return he took hold of the crank to start the motor and exclaimed that there was no compression whatever. I got down to make a personal investigation and found the exhaust valves were working and seating perfectly. I then removed the inlet valve from the forward cylinder and found between the valve and its seat a small pebble which held the valve open. This was remarkable enough, but did not explain the loss of compression in both cylinders. Upon removing the inlet valve of the other cylinder I found a pebble of almost the identical size in exactly the same position. It was an easy matter to push both stones out with a screw driver, and upon being replaced the motor worked perfectly. It, perhaps, was not so unusual that these small stones should have been sucked up through the hot-air intake and the carburetor, but that both should have been caught in like positions at practically the same instant of time seems almost too remarkable to believe.

Harrison Musgrave.

Possible Causes of Gasoline Engine Spells.

Editor Horseless Age:

Several correspondents have recently inquired for an explanation of peculiar or whimsical behavior of their vehicles, this behavior manifesting itself by weak and imperfect action in one instance and strong and perfect action in another. There are many causes for such behavior, such as a clogging of the gasoline supply, not permitting sufficient gasoline to be supplied or, after adjustment, a clearance of the clogged passage, resulting in excess of fuel. In some instances an excess of oil may gum the valve stem or deposit on the valve seat and cause trouble, but afterward wear away, leaving full power as before. Excessive oil or dirt on the vibrator points or contact parts may interfere with the spark to the same end. Other causes not connected with the motor but producing apparently the same result may exist. The average hub brake, for example, is open on top and in position to receive mud and sand dropped from the tire when passing through a mud hole. This obstruction produces a drag and gives the operator the impression that the vehicle has lost power. It may be forced out at the first application of the brake, or it may gradually wear out and thus permit normal conditions. The same thought applies to any of the bearings which may not be receiving oil properly and regularly. A very little drag on any part of the auto is quite perceptible when power is wanted, and operators should be exceedingly careful to frequently test their vehicle by pushing it to see that it runs freely. They usually get some idea of the motor each time they start it.

A further cause, of no less importance although apparently not recognized by many auto builders, is impure air. An engine to do good work needs oxygen just as imperatively as does its driver, and unless it gets its proper supply it cannot develop full power. Many vehicles are in use which take their air supply from the rear of the carriage, frequently in proximity to the muffler. That more or less exhaust gases are drawn in cannot be denied, and the result is unquestionably impaired. The writer has known instances where it has been impossible to start the vehicle because the wind was in such a direction as to carry the exhaust direct to the intake pipe, and in such vehicles the difference in power, due to a difference in direction, was very perceptible. To this is probably due much of the whimsical action ascribed to the gasolne auto. The only conclusion to be drawn therefrom is that the exhaust gases should be turned out at the extreme rear and directed straight backward, so that they will absolutely clear the vehicle and be at least well mixed with air before they can possibly be blown back into the vehicle.

In addition to this, the intake pipe should be carried to the front, where the air is most likely to be clean and pure. The fact

that most motors located in front secure this condition undoubtedly accounts largely for the supposition that a motor works better in front. A hard-headed piece of machinery like a motor is not superstitious and will work equally well anywhere if the conditions under which it works are complied with. It should be kept in mind that the exhaust gases rise and therefore readily fill the upper part of the interior of the body of the vehicle and that there is frequently a forward current inside the body carrying these gases to the extreme front end unless prevented by partitions or similar arrangement. It is not enough, therefore, to take the air supply from inside the front end of any box or body to which the exhaust gases may have access if the best results are desired. Another cause of trouble directly related is due to moisture in the air. Less gasoline is required on a wet day than on a dry one, because a cylinder full of a mixture containing water vapor necessarily contains less air. On this account the proportion of air and gasoline should be adjusted daily and probably hourly. CHAS. E. DURYEA.

Reductions of Gear for Use of Solid Tires.

Editor HORSELESS AGE:

Please state through the columns of your paper or otherwise your estimate on the amount of power lost by using solid rubber tires in place of three-inch pneumatics, figuring on six horse power geared on top speed to approximately 22 miles per hour; what would be your estimate on the proper reduction of speed with the idea in view of equipping the same with solid rubber tires, the weight of the machine being about 1,000 pounds?

W. J. MOORE.

[We believe that the loss of power on fairly smooth roads is almost inappreciable, and as far as power is concerned there would be no need for reducing the gear, because when the engine is pulled down in speed and works at its hardest, the speed of the car would be so slow that the traction resistance would be the same with solid and pneumatic tires. On sandy roads, however, the solid tires would always require more power, as owing to their smaller width they allow the wheels to sink deeper. It is well, therefore, to gear the car somewhat lower if it can conveniently be done, particularly, also, because this will better protect the propelling mechanism from shocks, and in climbing hills the car will be more powerful in proportion to the gear reduction. If it is now geared to 22 miles per hour, we would suggest to gear it to about 18 miles per hour.—ED.]

Probable Explanation of Engine Spells.

Editor HORSELESS AGE:

In regard to W. E.'s engine weakness, *he may find his trouble the same* as I found mine, as he is using the same carburetor. My engine would run good after starting up, but after a short time would slow down and quit. I had a very good mechanic help me hunt for this trouble, and for a long time we failed to locate it, and then succeeded only by the very closest examination. In this carburetor is a small gauge strainer which had become almost closed with paraffine out of the gasoline, allowing the gasoline to come through so slowly that after using up what was in the carburetor when starting the engine would slow down and quit. This paraffine is almost transparent, and will only be observed by the closest scrutiny. I cut off the end of this strainer and have had no trouble since. D. B. S.

Agricultural Motor Vehicles

Editor HORSELESS AGE:

I was interested in a question asked you by S. I. Fries, on page 320 of the September 28 number, which was as follows: "Do you know of an auto made to haul a trailer and do light farm work?" I think Mr. Freis has reference to those farm motors which are in use in England, which are 14-h. p. 2-cylinder machines, which weigh from 2,500 to 3,000 lbs. and are used for any work which a 3- or 4-horse team is used for. There is a general desire among progressive farmers for such machines, if practical. Do you know if such machines are being made anywhere in the United States? H. E. E.

[No such machines are made in this country, we believe.—ED.]

Speeds.

Editor HORSELESS AGE:

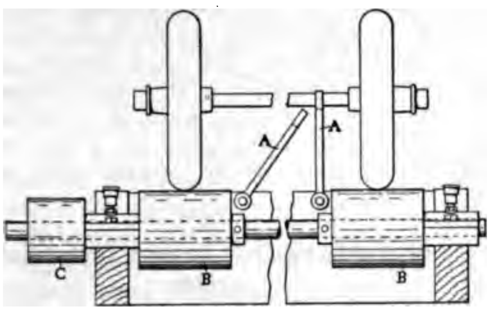
I have noted little, if any, reference in print to the results obtained by use of the speed-measuring devices now being applied to automobiles, other than certain items regarding testimony introduced in court proceedings to show that the timing by policemen in certain cases was erroneous. I have recently applied a guaranteed instrument of this nature to my regular touring car, and was so surprised by the results that I doubted the accuracy of the instrument until I had tested the same by timing over known distances. I now find by running the machine alongside of horses, trolley cars, etc., that the public's idea of miles per hour is very vague. Carriages are pulled by horses at the rate of 20 miles an hour in thickly settled communities without exciting the slightest comment. Trolley cars run at the rate of 25 miles per hour in many crowded streets. The ordinances of many of our cities confine automobiles to 10 miles an hour, and some of the meaner country towns pass local ordinances restricting us to eight, and even six miles an hour. An automobile that is moving at ten miles an hour hardly appears to move at all, so far as the perception of those riding in the machine is concerned. It is doubtful if the regular, large sized touring cars can run as slow as ten miles an hour on their high speed drive. As a matter of safety, it is certainly better that they should run at higher speed, for a slow-moving heavy vehicle cannot respond quickly to the steering wheel. The average automobile strikes a 20-mile-per-hour gait in suburban districts without apparently causing any one to imagine that the speed law is being tampered with. Twenty-five miles per hour is very common on less frequented roads. Automobiles capable of nearly forty miles an hour find it difficult to pass trolley cars when the motor man is at all inclined to test speed. I think it may be safely assumed that over 90 per cent. of the automobiles in daily use are breaking the laws of the State every time they are used. It seems to me that no fair-minded legislator would vote for a 15-mile-per-hour restriction if he were given a chance to know what fifteen miles per hour meant, by riding in an automobile with a speed-measuring instrument. I hope the use of these devices will spread, and that each automobile owner will take it upon himself to educate the nearest legislator in the absurdity of the present restrictions. Those who now break the law are not intentionally contemptuous of its majesty. They simply find it unjust and unfair, and decline to respect it in its present wording. The public feeling aroused by reckless automobilism does not apply at all to a speed of twenty or twenty-five miles per hour. To the onlooker such speed in an automobile is apparently moderate and reasonable, for it is judged by appearances rather than knowledge. The speed which really annoys and awakens criticism would be found, on measurement, to be at least thirty-five and possibly forty-five miles per hour; a speed easily attainable by the more expensive class of higher powered cars.

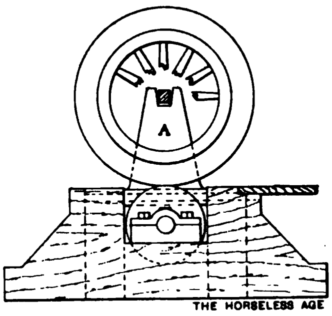
GEORGE OTIS DRAPER.

Another Electric Test.

Editor HORSELESS AGE:

In the October 12 issue of the HORSELESS AGE, C. W. M. advises the use of a telephone receiver in testing for currents. Another very simple and cheap method is to screw an old discarded electric door bell in some out of the way corner, as in the upper part or against the door of the luggage box; attach some flexible wire, and you can test any part of the circuit. You always have your tester with you, it is always in place and ready, and out of the way. I have tried one of these little vest pocket electric light affairs, and find them all right to test individual cells, when the little platinum wire will give a red glow, but trouble is often found in the wiring away from the battery, and when this tester is used on the entire battery and the "juice"





is struck, the wire burns up instantly, and all further testing is off with this tester. After burning my little test lamp, I resorted to the electric bell, and now have no difficulty in locating a break very quickly.

A. G. H.

Rigging for Using Vehicle Motor for Power Purposes.

Editor Horseless Age:

I have often heard automobilists remark that they would like to use their car for driving stationary machines, if it was not for the fact that the addition of the fittings required would spoil the appearance of the car. In this connection I enclose a sketch of my "threadmill," which may be of interest to some of your readers, as it is quite simple and was constructed at small expense. In tests with several different cars it has proven quite practical for a number of different users. Two brackets AA are hinged to blocks and swing up to catch the rear axle, holding the car on the platform, with the rear wheels resting on the rollers BB mounted on a shaft supported in two plain bearings. The machine to be driven is belted to the pully C. The engine should be operated on the direct drive, so as to save the gears and prevent loss of power. If the radiator is not large enough to keep the engine cool under such conditions, the jacket may be piped to a stationary tank instead. The details of construction may, of course, vary considerably.

P. E. DuMond.

OUR FOREIGN EXCHANGES

Road Preservation in France.

While there is nothing new in the fact that European highway authorities are using hot pitch as a road preservative and means of preventing the formation of dust, it is well to state that the first tentative efforts in this direction have resulted in the perfection of a system the excellence of which is beyond question. I have had frequent opportunity this summer to compare stretches of tarred and untarred highway, to the advantage of the former. The principal suburban boulevard of Marseilles has just been so treated. It is a popular error to describe the process as a mere sprinkling of hot pitch. It is equally an error to suppose that valuable results may be obtained by smearing hot pitch over loosely constructed gravel or clay roads. On the other hand, it may be expected that dust will be effectively banished from a well-built macadamized highway into which hot tar is thoroughly worked, and that repair cost will be diminished by from 25 to 40 per cent. In support of these observations, I give herewith some remarks from Road Commissioner Girardeau of Fontenay-le-Comte (Vendée), who has prepared a pamphlet on this subject:

The tarring of highways is no idle whim, but a method of maintaining them which should be placed in the foreground with other details of maintenance. As roadways are shaped and surfaced, they should be tarred. Much time will pass before this method is adopted, in spite of the certainty of acquired results. The object of banishing dust is praiseworthy enough in itself, but since we may do this while also solidifying and improving our highways, the system should be well received by all who are interested in our public routes. My method is not to hold down the dust for two days, a week, or a month—it is to prevent its formation.

I do not comprehend how the separation of the fight against dust and the maintenance of the highways can be considered. That which forms the dust arises from the disintegration of the road. A road without dust is one that does not wear out, or at least does so imperceptibly.

First of all, let me proscribe a coal tar subjected to one distillation, that is to say, deprived of the light oils of the raw material. These oils are no less valuable for their effect in the road-tarring operation than they are in the industries. It is indispensable to employ undistilled pitch, which boils at about 80° C.

This product should be brought to a temperature approaching that of ebullition, since in this condition it is most mobile and penetrates best into the material of the roadway. To spread a pitch at 60° C. is a grave error; on the other hand, at 80° C. it is easily inflammable and spills over the side of the boiler. This inconvenience I have avoided by having a special apparatus made by Chappée & Co., of Mans, which permits of the watching and regulation of the heating. This device is light and, being mounted on wheels, is easily transported.

The pitch leaving this apparatus while boiling is spread upon a roadway prepared to receive it. The workmen must aim not to cover the surface as with a carpet, by spreading on it a thick layer, but rather to cause the tar to penetrate the highway itself. This result depends upon proper preparation of the road surface and the careful spreading of the hot tar.

It is preferable to work upon a resurfaced road or certainly one in good condition. All work must cease if the ground be cold or damp. A heedless spectator might be delighted with the first aspect of his work upon a damp surface, as the pitch would promptly form a smooth carpet. Such work scarcely lasts through one summer, however, and goes to pieces with the first frosts. A thoroughly dried roadway must be taken, such as we have in July, August and September. From the surface every particle of dust must be removed. Ordinary mechanical sweepers are not proper for this task. Metallic-thread brooms are equally out of the question. We must have a sweeping material less hard than the road surface, in order to clean without breaking it.

The pitch should be distributed from the center of he roadway. It should be poured, not sprinkled. The sprinkler is exactly the instrument which should be selected if the object were to chill the coal tar as quickly as possible. It is a very simple matter to pay out the pitch in small quantities and to spread it immediately upon the surface. The pitch penetrates well into the joints and impregnates thoroughly the whole roadbed. This process is aided by rubbing it in energetically with stiff brooms, which open the joints and conduct the pitch. One must not be disquieted by the rough aspect of the road surface—after several days it becomes united, compact and resistant. A very little sand, or even dust, thrown over the surface five hours after the dosing of tar completes the operation.

I have tarred roads for eight years, and have followed the above method for four years. My tarred roads last twice as long as those not so treated. The wear is imperceptible, especially during the first years. Certainly tarred roads do wear and need maintenance, and in my pamphlet I have set forth the conditions of this maintenance.

According to material composing the roadway and other conditions, the economy resulting from the tarring of roads varies from 25 to 40 per cent.

Inexperienced persons usually begin by spreading a great deal of pitch, thinking to get better results. In reality they expend their money to obtain an ephemeral success. —Robert P. Skinner, Consul-General, Marseilles, France.

Naphthalene as Motor Fuel.

While gasoline is open to many objections, particularly the great fire risks involved in its use, due to its great inflammability, so far no fuel has been found which can compare with it in every respect. At first much was expected of denaturated alcohol, the vapors of which are less inflammable than those of gasoline. Besides, as alcohol is soluble in water, and does not float on it, an alcohol fire may be extinguished by means of water. Heavy petroleum oil has also been used to some extent, and recent experiments with a Peugeot car show that the use of naphthalene has been considered.

Far be it from us to discourage those who seek to employ this fuel, or rather to adopt it to existing motors; but we believe that they are making a mistake, the same as those who attempted to substitute pure alcohol or alcohol mixtures for gasoline in explosion motors without making any modifications in these motors, and who concluded from their failure that alcohol and alcohol mixtures are not adapted for use as motor fuels.

Naphthalene is a solid hydro-carbon which can be purchased at a low price, because it is a by-product in a number of manufacturing processes, being produced in gas works, petroleum and shale oil refineries, etc. The only use to which it is put at present, after some few trials in the dyeing industries, is to keep moths out of our clothes (as moth balls). The choice is therefore judicious, but it appears that all these experiments have been abandoned. Let us see what may be the reason for this.

The first attempt of utilizing this product was made by gas engineers, it being found that gas tubes were frequently obstructed in winter by deposits of crystallization of naphthalene. This crystallization of naphthalene decarburized the gas, and consequently diminished its illuminating power, which was particularly noticeable because incandescent gas lights were not known at that time. It was therefore proposed to place the naphthalene in a small boiler close to and heated by the gas flame, so that the gas was recarburized before burning. The idea would have been not at all bad if, on extinguishing the flame, the naphthalene had not frequently clogged the openings in the burner tip, and it was necessary to open the tip up before the burner could be lighted again. When incandescent gas lights came into use this system was entirely abandoned.

Later on, naphthalene was proposed for use in whitening the flame of kerosene lamps and for carburizing alcohol for illuminating purposes. Naphthalene is only sparely soluble in alcohol, alcohol at 95° dissolving only 4 to 5 per cent. of its weight of the substance. But this small quantity communicates to the alcohol a very peculiar property, that of dissolving a *very large proportion of kerosene oil* (25 to 50 per cent. in volume, according to the origin of the oil), particularly the heavy oils of Russia and Roumania. It is this property which several years ago permitted to obtain carburetted alcohol of a calorific power almost as high as that of gasoline. Unfortunately, a very small quantity of water, even the humidity of the air, disturbs these rather unstable mixtures by reducing the degree of the alcohol. That difficulty could have been overcome, however, with some care, and would not have prevented the use of the mixture for lighting, as well as for motor purposes, if the naphthalene had not also communicated another very serious defect in all these liquids.

Naphthalene, although volatile, is a solid very readily sublimable; that is to say, it will condense into the solid state on the least lowering of temperature much more readily than the liquids (gasoline and alcohol) in which it is dissolved, consequently the least stoppage causes the wicks of the lamps to harden, and the orifices of the carburetor to clog, and a careful cleaning becomes necessary before the burning process can be continued. This trouble is constantly to be expected in the use of this combustible, either alone or in solution, in motors as at present constructed, and it is inadvisable to seek to solve the problem in this direction.

To arrive at a satisfactory solution it is necessary to start with the most advantageous combustible or combustible mixture, according to the country and the conditions under which the motor is to operate, then study the motor for the best utilization of the fuel decided upon. Only under these conditions are there any chances of arriving at the solution insuring the greatest economy for each particular case.—*La France Automobile.*

Professional Chauffeurs Classed as Servants.

In Belgium professional drivers or mechanics in the employ of automobile owners are taxed as servants. The committee of the A. C. of Liege recently asked the Minister of Finance for an explanation in the matter, and received a reply from which the following is abstracted: An automobile driver in the exclusive and permanent employ of a private person, and whose chief duty consists in driving and taking care of one or several motor-propelled pleasure vehicles, belongs to the class of taxable servants, the same as the coachman, stable hand, etc., all the same whether in addition to his usual duties he also serves as butler, etc.; whether he lives in the house of his employer or not, or in what manner he is compensated for his services. In case an automobile driver is employed chiefly as workman in a business, trade or industry, and is also called upon to drive and care for a pleasure automobile, or a commercial motor wagon which may on occasion serve for pleasure purposes, he is regarded as a workman-servant (ouvrier domestique) and taxed accordingly. An automobile driver, even of a pleasure car, who simultaneously serves several different families not residing together, is not taxable. The same applies to professional drivers employed by manufacturers and dealers.

German Motor-Cycle Dispatch Bearer Competition.

Under the auspices of the German Motor-Cycle Club and in honor of Prince Henry, a race or run of military dispatch bearers mounted on motor bicycles was held between Stuttgart and Kiel, Germany, on Monday, September 18. The event is reported to have proven a complete success. Herr Struck, of Berlin, rode the whole of the 770 kilometres (462 miles) from Stuttgart to Kiel, starting from Stuttgart at nine o'clock on Monday morning and reaching Kiel at twenty-five minutes past eight Wednesday morning. He filled up his motor reservoirs six times during the ride, using 2½ gallons of gasoline. The German Motor-Cycle Club, which initiated the race, was started sixteen months ago, and now counts 5,200 members. Prince Henry entertained the competitors in the race at his castle at Kiel.

Old Roman Roads in England to be Restored.

The Roads Improvement Association, associated with the A. C. G. B. and I., is backing a movement to restore the old Roman roads in England, to adapt them particularly to automobile traffic. The project was discussed at a recent meeting of the Association's Committee. In a report drawn up by the committee it is stated that the old Roman roads seem very suitable for the purposes indicated, for these reasons:

1. The land is there still dedicated presumably to the public, so that the expense of purchasing and laying out land would be avoided.

2. The Roman roads, while going across the country usually in a straight line, avoid to a really remarkable extent the chief present centers of population.

3. It is believed that in many cases the old foundations remain intact, which would be a further saving of expense.

4. Where a modern high road occupies the sight of an old Roman road, the latter was in many cases much wider than the metalled part of the present highway, so that it would be possible to make a new road on it parallel to the modern one without great expense.

5. In several cases the Roman roads would be especially useful as affording main direct roads going across the main roads which radiate from London.

The sub-committee also give particulars of twelve Roman roads (not by any means all that have been traversed) which seem capable of being used in the manner indicated.

The complete scheme is one of some magnitude, and powerful influences are being brought to bear to further it. Members of Parliament are taking a keen interest in the matter, and Captain Smyth thinks there is every probability that the question will before long be introduced into the House of Commons. Earl Russell, one of the representatives of the Automobile Club, wrote that he entirely agreed with the sub-committee's suggestions, but added: "To carry them into effect, I should think the first think would be a local public agitation arousing interest in them. Under our present system the only way to carry out a complete road would be for the various County Councils to meet together and agree that these should be the main roads so far as the portion in their districts is concerned. I should think, with sufficient public pressure, the matter might at any rate be carried far enough to get them to instruct their surveyors to report minutely and accurately as to the cost. I should suggest that wherever possible these roads should not be of less width than forty feet if they are brought into use again.'

The Semmering Hill Climbing Contest.

The sixth annual hill climbing contest on the Semmering hill, Austria, under the auspices of the Austrian Automobile Club, took place on September 25, and was a complete success, in the estimation of the organizers. The start of this contest took place in the town of Schottwien, and the course is a winding one, up the mountain side, a total distance of 6.25 miles. All former records were smashed, except those for light cars and touring vehicles, in each of which classes there were less than three entries, and which were therefore cancelled. Owing to the many very sharp turns, it is claimed, the contest is more a test of the driver's skill than of car power. The best time and new record for large cars was made by Braun, on an Austrian Mercedes, viz., 8m. 11 3-5s. The best time and new record in the voiturette class was made by Hieronymus, on a Spitz car, and the best time and record in the motor bicycle class was made by Bittner, on a Cless & Plessing. All records were therefore scored by machines of Austrian construction.

Dourdan Speed Trials.

Dourdan Speed Trials—General View.

The annual speed trials on the Dourdan road, in France, took place on Monday, October 3. The course of the trials is recognized by the Automobile Club of France as an official course for speed records, although it is said to be less speedy than the track at Ostend and the Boulevard des Anglais in Nice. It leads through a forest and is quite narrow, but, of course, straight. It had been raining during the night before the race, but the trials were held in fine weather. The timing was done by means of the Mors electric timing apparatus by Messrs. Tampier and Gaudichard, official timers of the A. C. F. The event was for both touring and racing cars, the former being classified according to price, while the latter were classified according to weight.

No speed records were broken except in the motorcycle class. Lafranchi, riding a 2-cylinder Peugeot wheel, made a time of 33 2-5s. for the flying kilometer, corresponding to a rate of speed of 76.5 miles per hour. Darracq cars made the best time in all three classes for racing cars, viz., 25 1-5s. in the heavy racer class, 29 2-5s. in the light car class and 36 1-5s. in the voiturette class. These times are for the flying kilometer. In addition to this, there were trials for the standing mile. Among the competing racers was an 8-cylinder Dufaux, built in Switzerland, but it made no better time than 30 2-5s. for the flying kilometer, and 63 2-5s. for the standing mile. Among the touring cars, Boyers made the best time in the two lowest-pricd classes, Gardner-Serpollets in the next two, a Radia in the fifth and a Mercedes in the sixth. There were twenty-one competing cars and almost as many motorcycles.

The Herkomer Competition for Touring Cars.

On Sunday, September 18, the Bavarian Automobile Club took a drive to Landsberg on the Lech, in Upper Bavaria, to pay a visit to Professor Hubert von Herkomer, its honorary member. Pro-

Coquard in the Corbe.

fessor von Herkomer has offered a cup for an international competition for touring cars. The cup is to be worked in silver and enamel by the artist himself, and besides being of considerable material value, will be a valuable piece of art. The prize will be competed for not more than five times, and winners who may loose it again will receive special prizes, the winner in 1905, for instance, a prize of $5,000, offered by Dr. Magin, of Paris. The first competition will take place in the vicinity of Munich. During the meeting at Landsberg Professor von Herkomer announced that he would paint a portrait of each winner of the Herkomer prize. It is stated that portraits by the Professor are paid for at from $5,000 to $10,000, and it is expected that this offer will be a great inducement to amateur drivers. The rules of the competition will be published shortly.

Durability of Tire Bands.

A correspondent in the *Automobile Club Journal* states, with regard to the durability of non-slipping treads, that on the front wheels of a 10 h. p. car he used a pair of ordinary pneumatics of well-known make for 4,000 miles. On the driving wheels he had (1) a pair of "Ser" bands, which ran about 1,300 miles; (2) a pair of "Grose" bands, which ran 1,500 miles; (3) a pair of same, which went wrong in hot weather in 100 miles; (4) a pair of Michelin covers, which ran about 1,200 miles; (5) a pair of "Grose" bands, one of which had lately gone wrong after 600 miles. He concludes, therefore, that leather-studded bands at present do not run as far as they ought, especially in dry and hot weather, although they are effectual as non-skids. They heat very much in hot weather, and the vulcanizing gives way in consequence.

Another correspondent in the same journal writes that he lately returned from a 1,200-mile tour in Wales, having L'Empereur bands on the back wheels. He had no trouble whatever as regards skidding or punctures, and the tires had no marks when the bands were removed. The chief objection to them is that they stretch rapidly, namely, 6 inches in 1,200 miles; and on one occasion the band broke, and fell over the driving chain, but was, fortunately, quickly detected. He thinks that for town work and short runs they are excellent, though somewhat noisy. One thing in their favor is that they do not ruin tires, like leather-studded bands. The writer estimated they will last him another 1,200 miles, thus costing 1½ cents per mile, but when removed the tires are as good as new.

The Marquis De Dion has modified his proposals regarding alterations in the rules for the Gordon Bennett race, and now suggests that the course should be 625 miles in length and the race last two days; that the *cup should go to the team* making the best record collectively, and that the number of tire covers and inner tubes used should be limited.

As recently reported, there are now nearly a hundred motor cabs in Berlin, and the police department has recently assigned them twelve regular waiting places (exclusive for motor cabs) at which there must always be two cabs ready to take fares, while as many as five, six or eight may be lined up at these points, according to the available space.

The commercial vehicle contest of the Automobile Club of France, which, after several postponements, was to have taken place the present month, has again been postponed until next May. A contest for wheels and pneumatic tires is to be held in connection with these trials. Evidently the commercial motor vehicle is making very little progress in France.

The first fire fighting "train" will shortly be put in service in Berlin. After an inspection of the motor-driven fire engines in use in Cologne, Hanover and Offenbach by a committee appointed last winter by the city government, it has been decided to acquire three motor-driven vehicles for the fire department, a chemical fire engine, a steam pump and a ladder wagon.

The Automobile Club of France recently made public the results of its carburetor contest. In the class for kerosene carburetors, silver medals were awarded to Longuemare and Gautreau. In the class for carburetors for any fuel and any motor, a gold medal was awarded to Longuemare, a silver-gilt medal to Saint-Denis and a silver medal to Hanow, Michaux and Chalous.

On Saturday, September 10, under the auspices of the Western Section of the Scottish Automobile Club, a hill-climbing competition took place on the public road above Kirkfieldbank known as Kirkfield-hill. The stretch measured 701 yards and had an average gradient of 11 per cent, while 440 yards had an average of no less than 14 per cent. Among single cylinder cars a 6-h. p. Wolseley made the best time and a 6½-h. p. Cadillac second best.

The French competition for military motor wagons began on Monday, October 3, and was abandoned the same day. Only five of the eight entries presented themselves for the start, viz., a Cottereau, a Mathian, a Latil and two Aries. The vehicles were weighed and started on the first day's run, and the commission having the contest in charge then held a meeting and decided to abandon the contest, as they found that the machines entered did not meet the conditions set by the Minister of War.

The Avenue des Champs Elysees in Paris is to be prolonged as far as the forest of St. Germain, making it eight miles in length, with a width of 130 feet. The center will be taken up by an electric railway, which will be a continuation of the Paris Metropolitan, and on either side of the railway will be tracks for automobiles, cycles, horse vehicles and pedestrians. The total cost of this vast undertaking, including the bridges which it will be necessary to construct across the Seine, is expected to be about $2,000,000.

A case similar to the Gurney incident at Lenox, Mass., arose in Dublin on September 30, when Arthur Donn Piatt, acting American Consul, was summoned by a constable for having driven his motor tricycle recklessly, and at a speed dangerous to the public. The justice imposed a nominal fine of 10 shillings, although a young lady who occupied a trailer attached to the machine testified that it was not being driven recklessly. Counsel for Mr. Piatt mentioned that the latter was an American citizen, but the justice retorted that that might insure the immunity of Ambassadors but hardly of a Consul.

Colorific Power of Liquid Fuels.

In a paper recently published in the *Revue Technique*, M. L. Levi makes the following comparison between the calorific values of different fuels used in internal-combustion engines:

	B. T. U. per lb.
Methylated alcohol	10,620
Methylated alcohol mixed with 50 per cent. gasoline	14,200
Crude American oil	19,630
Refined American oil	19,880

The mixture of methylated alcohol can, it is stated, be used as easily as ordinary gasoline, but with unmixed gasoline it is necessary to warm up the carburetor a little before starting, as the alcohol does not vaporize readily enough below a temperature of 68° Fahrenheit. As an alternative gasoline may be used at the start, the alcohol being supplied later. No trouble is found with the admission-valves in using alcohol, and if at times there is a deposit of soot or tar, this arises generally from the use of a bad carburetor. A little acetic acid results on combustion, but not enough to cause damage. The carburetor should be of a type which will deal out a measured quantity of the liquid at each suction stroke. The exhaust gases are free from the unpleasant smell prevalent in the case of gasoline motors. The principal objection to the use of spirit lies in cost, which, to compete with gasoline, should be about twenty cents per gallon in place of about twice as much, as is at present the case in France. In Germany the cost of methylated alcohol is only about 18 cents per gallon, so that the alcohol motor is becoming more and more popular there.

w Vehicles and Parts

Munson Gasoline-Electric Tractor-Truck.

e motor truck shown herewith was by the Oil Well Supply Co., of Pitts-, for use as a tractor for switching ht cars in the company's yard, and for ing steel and other oil well supplies to from the factory and depots. It has in use doing this kind of work for ast fifteen months, and is said to have en entirely satisfactory. On a level : it can start and move in either direc- six "one hundred thousand pounds" loaded, the weight of these cars empty g between 40,000 and 50,000 pounds . The tractor does not run on the like a switching locomotive, but on roadbed, straddling one rail, or at the of the track. It may be coupled to r end of a car by means of drawbars, he truck may be run alongside of the and hitched to it by means of a with hooks engaging into eyes or es at either end of the truck platform at the side of the car. In case a car ot provided with these staples, a chain rown around the axle box of the car attached to the truck.

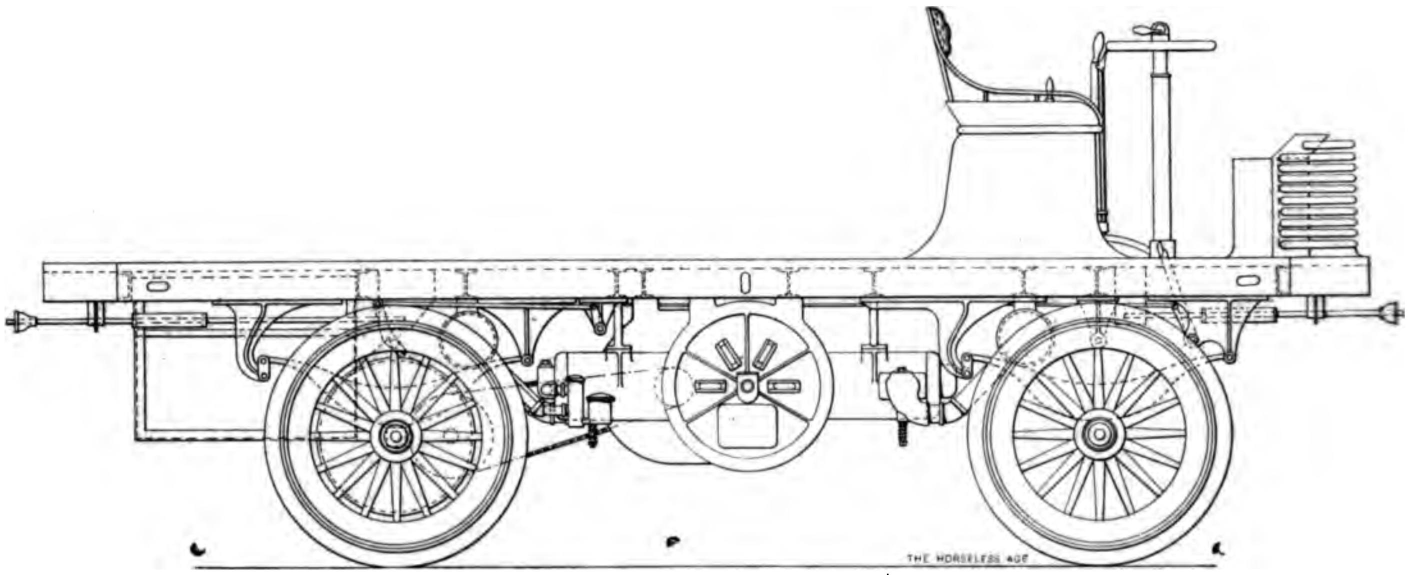
e tracks in the sheds where most of witching is done, are of the usual rail- construction, some being filled up to d a good roadway for the truck, while e case of others the truck runs on the ties. The service is therefore quite severe, and it is particularly difficult to get traction sufficient to start the cars in motion. When switching outside, and particularly on wet asphalt, it is often found necessary to place a weight of 3,000 pounds on the truck platform directly over the rear wheels to prevent slipping. It is claimed that with its full load of six tons the truck will start from rest and haul three large type loaded freight cars on a curve of 110 feet radius.

It is apparent that in work of this kind one of the most important requisites of the power system is the ability to develop abnormal torque for short periods, as the effort required to start a train of cars from rest is very much greater than that required to keep it in motion. The combination gasoline and electric system as employed in the truck under consideration is, therefore, admirably adapted for the purpose, the engine and dynamo (working as motor) combining their turning efforts when pulled down in speed, and the dynamo even working up to an overload of several hundred per cent. in extreme cases. Another advantage of the system is that the engine is started automatically by means of the dynamo, the latter drawing current from a storage battery carried on the truck, so that no cranking is required, and all machinery is at rest when the truck is stationary. The movable part of the dynamo (the armature) serves as flywheel to the engine, and the dynamo adds, therefore, only little to the weight of the power equipment.

The motive power consists of a double cylinder, horizontal-opposed gasoline engine of 6in. bore and 8in. stroke, rated at 25 h. p. It is hung from the cross members of the platform frame, a considerable distance below the latter. The inlet valves are arranged in the cylinder heads and the exhaust valves at the side of the cylinders. The exhaust valves are operated from a cam shaft running underneath and parallel with the cylinders, which is driven from the crank shaft through a pair of spiral gears. The driving gear of this pair is fitted directly over the central arm of the double throw crank, the object being to economize space in the direction of the crank shaft. Exhaust valve lifters are fitted to the engine, and are operated by means of small handles on top of the steering column. In starting the engine, the two exhaust valves are raised from their seats and are only released when the engine has run up to speed, thus greatly reducing the strain on the dynamo and on the battery supplying it. The two cylinders are bolted to a cylindrical cast iron crank chamber with heads or end plates in which the crank shaft bearings are supported. The crank shaft projects from both bearings, one end carrying the armature of the dynamo and resting in an extra bearing in the dynamo casing; and the other end carrying the change gear pinions.

Ignition is by means of the jump spark, the spark plugs being secured in the cylinder heads. The commutator is carried on the cam shaft below the cylinders, and the coil is arranged under the driver's seat. Sparking current is derived from one of the four sets of storage cells supplying the dynamo, the spark coil being operated at 20 volts, and without vibrator. The gasoline

THE MUNSON GASOLINE ELECTRIC TRUCK.



SIDE VIEW OF MUNSON TRUCK.

tank, which is made of copper and has a capacity of about twenty gallons, is arranged under the driver's seat. It feeds to two Kingston carburetors, one for each cylinder. Each cylinder also has a separate muffler arranged crosswise of the frame directly below the platform, and at only a short distance from the exhaust valve. Owing to the use of double carburetors and double mufflers, there is only a very small amount of piping on the truck.

The connecting rod and main crank bearings of the engine are lubricated by splash in the crank chamber, while the cylinders and the gear box bearings are lubricated by a Lunkenheimer pressure oiler with eight feeds, secured to the dash. The small oil tubes from the oiler to the bearings to be lubricated are run through a large pipe underneath the frame, through which also runs one of the water circulation pipes. The circulation water being always at a comparatively high temperature, the oil tubes are kept warm, even in the coldest weather, and lubrication is, therefore, always comparatively uniform.

The cooling water is circulated by thermosyphon action. A 15-gallon tank, made of ⅛-in. sheet steel with riveted joints, is carried on the platform in front, serving in a manner as a dash. In front of this tank is arranged a coil radiator. All the water connections are large, and the cooling is said to be thoroughly efficient, particularly as in the kind of work the truck is required to do it rarely needs to operate at full power for any great length of time.

The dynamo is of the 6-pole, internal-field type, and is rated at 5 h. p. normal and 15 h. p. maximum. The field magnet consists of two substantially equal steel castings which are clamped together and surround the single field coil. The armature is 21in. in outside diameter and weighs complete about 200 lbs. It is carried on a substantial steel spider with large hub keyed on a tapering section of the crank shaft. The armature is wound series fashion, which admits of using either two, four or six commutator brushes. Four brushes are actually used, this being the most convenient. The commutator is of the radial type, which requires the least space in a lateral direction. The outer head or end plate of the dynamo casing is provided with a large inspection door to permit getting at and cleaning the commutator without removing the plate. The bearing for the crank shaft in this end plate is a self-oiling ring bearing.

An 80-volt storage battery in four trays is carried in a case underneath the frame, back of the rear axle. The battery has a capacity of 60 ampere-hours and weighs complete about 600 lbs. All the electrical connections are made by means of a switch or controller underneath the driver's seat and operated by a short lever projecting up through the seat at the left-hand side. By means of this controller the battery can be connected to give either 20, 40 or 80 volts. For each connection the dynamo has a certain critical speed; if it is driven above this speed by the engine, it sends a charging current into the battery, while if pulled down below this speed by the load on the truck, it draws a current from the battery and assists the gasoline engine in propelling the vehicle. The normal speed of the engine with the controller set for forty volts is between 600 and 700 r. p. m. In starting the engine, the two exhaust valves are first lifted from their seats by means of the lever provided for the purpose; then the controller lever is moved to apply to the dynamo a current of 20, 40 and 80 volts in succession, and when the engine has been brought up to speed the exhaust valves are let down, and the engine automatically starts to operate. The ignition current is switched on and off by means of the controller at the same time that the current is admitted and cut off from the dynamo.

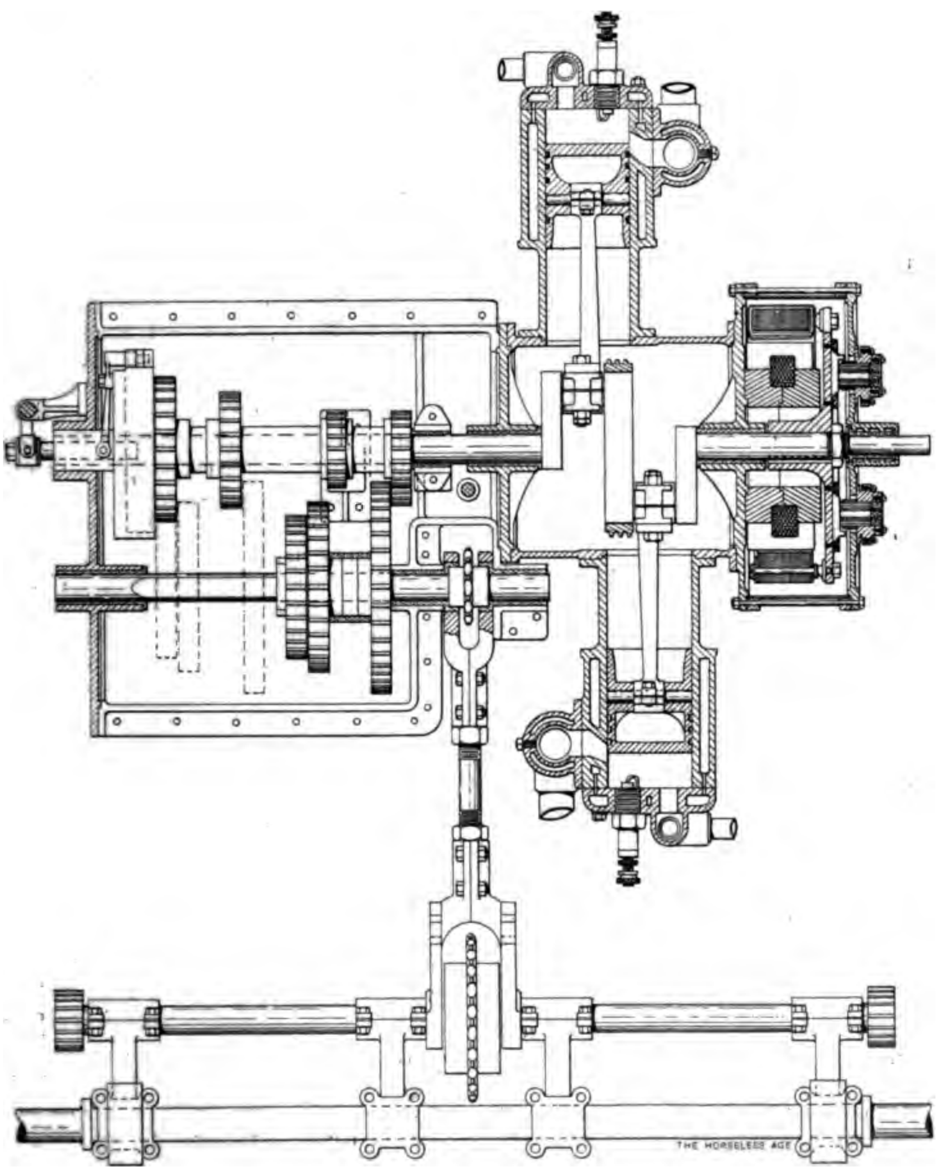
The change-speed gear is of the sliding pinion type, and gives three forward speeds and one reverse. It is operated by means of what is referred to as a compound clutch, consisting of a drum to the outer surface of which is applied a friction band and to the inner surface an expanding friction ring. Both the inner and outer friction members are applied by the same operation, which consists in forcing a tapered spindle into the hollow end of the crank shaft by means of a foot pedal. The change speed gear comprises an extension of the crank shaft, with four steel pinions of 1½in. face width each, keyed to it; and a squared countershaft upon which may be slid a set of three sliding gears, one of these serving both for the slow forward speed and the reverse. The counter shaft projects from a bearing in the gear casing toward the engine, the projection carrying the diving sprocket. From this sprocket the power is transmitted by a 3-in. pitch chain to a sprocket wheel on a countershaft carried in four bearings directly in front of the rear axle. The driven sprocket is secured to a special differential gear of the spur pinion type. The four bearings in which the countershaft is mounted are formed in cast steel brackets extending forward from the rear axle. To the outer ends of the countershaft are secured two spur pinions which mesh with internal gears on the driving wheel. The total reduction from the engine to the road wheels on the high gear is 24÷1. The rated speed of the truck on the high gear is 9 miles per hour, and the truck may also be driven at 6, 4, 3 and 2 miles per hour; reverse speeds of 2 and 3 miles per hour are provided.

The wheels of the truck are 36in. in diameter, and are shod with double solid rubber tires, the tread surface being 6in. wide. The car has a wheel base of 8ft. and a track slightly greater than standard. The axles are of solid steel, the rear axle being 3in. wide by 3½in. high, and the front 3x3in. All wheel bearings are plain bearings. The platform frame is constructed of 4-in. I beams, on which is carried a plat-

form floor of 2-in. oak planks. In front of the frame is secured a solid oak bumper to absorb the shock when a truck is driven against a car. The platform frame is carried on the usual semi-elliptic truck springs It will be noticed that the platform is free and unobstructed, and it affords a loading space 10ft. 3in. in length and about 6ft. in width. The height of the platform from the ground is exactly the same as that of the floor of railroad cars. All parts of the mechanism are easily accessible from underneath. The weight of the truck complete is 9,260 lbs.

The truck is steered by means of a horizontal hand wheel through an irreversible worm and sector mechanism. Three-quarters of a turn of the hand wheel brings the road wheels from hard over one way to hard over the other way. It has two sets of brakes, one set acting on the gear drums on the rear wheels, being operated by a hand lever outside the seat; and the other set acting on the countershaft, and being operated by means of a pedal. Both brakes are interconnected with the clutch mechanism, so that the clutch is always disengaged before any of the brakes can be applied. The change speed gear is operated by a hand lever outside the seat, the connecting mechanism of which is interconnected with that for the clutch, so that the gears cannot be shifted until the clutch is first disengaged, and the clutch cannot be thrown in before the gears are in perfect mesh.

The truck was designed and built by Henry Hubbard, mechanical engineer of the Oil Well Supply Co., under the patents of John H. Munson. The manufacture of these trucks will shortly be taken up by the Munson Gaso-Electric Vehicle Corporation, of New York City.



Power Mechanism of Munson Truck.

Commercial Vehicle Notes.

Corporation Counsel Delaney, of New York city, has rendered an opinion to the effect that the size of the "Seeing New York" automobile, which Police Commissioner McAdoo complained about, is not in violation of any ordinance.

The Paris Omnibus Co. is making a series of tests with a Serpollet steam wagon. In the first trial the automobile covered the Bastile-Place Wagram route, making all regular stops, in 32m. against 54m., the time consumed by the horse-drawn stages.

The Library Board, of Chicago, is considering using automobiles for delivering books from the main library to branch stations. Tests recently conducted have shown, it is said, that a great saving could be effected in this service by displacing the horse with the motor.

In Holyoke, Mass., recently, a series of experiments were conducted to ascertain the practicability of automobiles in the fire service. A 16-h. p. car, equipped with a light buss body and loaded with men and apparatus, responded to a number of imaginary alarms for various parts of the city. It is said that the commissioner will recommend that the city purchase such a machine.

It is proposed to establish an automobile line from the center of Bessemer, Col., to the zinc smelter.

The City Council of San Francisco has voted to reconsider the recently passed ordinance, which fixes the charge for automobile livery at $3 for the first hour and $1 for each succeeding half-hour. The bill was vigorously opposed by the local automobile trade.

The Police Department of Syracuse, N. Y., is considering the advisability of adopting automobile patrol wagons.

At a meeting of the City Council of Springfield, Mass., on October 10, $2,000 was appropriated for the purchase of an automobile police patrol wagon.

Trade Literature Received.

Nash Pump Co., 19 Congress street, Boston, Mass.—Pamphlet regarding improved Nash fuel pump for steam carriages.

Lehman Bros., 10 Bond street, New York City.—Illustrated catalogue of Lehman carriage and automobile heaters.

Sidney B. Brown Automobile Co., 52 W. 43d street, New York City.—Folder describing Clement-Bayard cars.

Breeze Motor Mfg. Co., 33 Court street, Newark, N. J.—Descriptive folders relating to 1905 model Breeze motor cycle and Breeze Automatic Carburetor.

American Buffalo Robe Co., Buffalo, N. Y.—Catalogue of their lap robes and astrachan clothing.

Chicago Rawhide Mfg. Co., 75 East Ohio street, Chicago, Ill.—Pamphlet describing their tire sleeve, rawhide pinion gears and motor cycle belting.

The Acme Motor Car and Repair Co., Cleveland, O.—Folders directing attention in their 1905 type mufflers and tonneau dust shields.

The Joseph Dixon Crucible Co., Jersey City, N. J.—"The Lubrication of Axles," a pamphlet regarding their graphite grease.

E. R. Thomas Motor Co., Buffalo, N. Y. —Advance catalogue of 1905 Thomas "Flyer" cars.

MINOR MENTION

A race meet will be held at Overland Park, Denver, Colo., the last of October.

The Elmira (N. Y.) Arms Co. expect to erect a new 2-story garage within a short time.

The Rockford, Ill., A. C. propose to hold a joint harness and automobile race meet in the near future.

The Locomobile Co. of America have established a training school for chauffeurs at their plant in Bridgeport, Conn.

The Fruitvale Motor and Automobile Co., of Oakland, Cal., has been incorporated with a capital stock of $250,000.

The Miller-Mundy Motor Car Co., of Utica, N. Y., have recently moved into their new quarters at 26-28 John street.

Kendrick & Roberts are taking sub-estimates for a two-story brick garage on North Caroline avenue, Atlantic City.

The Pope Motor Car Co. have taken space at the coming Paris show. H. H. Lyttle will have charge of their exhibit.

W. Scott McDonald has brought suit to have the partnership of McDonald & Duvel, automobile dealers of Cincinnati, O., dissolved.

The Jackson (Mich.) Automobile Co. write us that they have recently shipped a number of automobiles to Buenos Ayres, South America.

The firm of John V. Rice, Jr., & Co. has been formed in Bordentown, N. J., to manufacture and deal in motors, motor boats and automobiles.

E. J. Stoddard, an occasional contributor to our columns, has been appointed instructor of the Detroit, Mich., Y. M. C. A. Automobile School.

The Locomobile Co. of America inform us that they have sold a 24-h. p. touring car to the Fire Department of New York city for the use of Deputy Chief Lally.

Frazier & Frazier, automobile dealers of South Bend, Ind., will move into a new remodeled brick building at St. Joseph and Jefferson streets within a few weeks.

The Crumrine Cycle Co. of Greenville, O., are putting on the market detachable tonneau seats and delivery wagon bodies for Oldsmobile, Ford and Cadillac runabout models.

The Waltham Mfg. Co.'s product for 1905 will include a four-cylinder, side entrance tonneau car, a lighter car of similar construction, and their regular buckboard models.

We are informed by Messrs. Hill & Holt, of Somerville, Mass., that they will move into larger quarters about November 1. They will conduct a garage and supply business.

*The suit of Manning, Maxwell & Moore, of New York, against the Eisenhuth Horse*less Vehicle Co., of Middletown, Conn., has been adjusted, it is said and the attachment for $15,000 released.

H. Bernard Hallam & Co., who have temporary offices at 602 New York Block, Seattle, Wash., are erecting a new garage and salesroom at the corner of Broadway and Madison avenue.

A number of accounts payable to the defunct Automobile Co. of America will be sold at public auction on October 17 at the office of Chauncey G. Parker, Prudential Building, Newark, N. J.

Will Vaughn, of Richmond, Ind., left recently in an automobile for San Francisco. From there he will proceed by steam to Japan, where he expects to establish an automobile sales business.

It is announced that the Columbus (Ohio) Motor Vehicle Co. have compromised 95 per cent. of the claims against them, and that court proceedings will, therefore, be dropped. The company will reorganize.

It is understood that Governor Batchelder of New Hampshire will recommend the expenditure of $1,000,000 in improving roads throughout the State, in his message to the Legislature when it convenes in January.

President Schurtz of the Grand Rapids A. C. last week asked the A. A. A. to withhold the sanction for the race meet promoted by W. S. Daniels of that city. The club claims that the meet would be of the "fake" variety.

The Prudential Trust Co., of Cleveland, O., receiver for the American Motor Carriage Co. of that city, has filed a formal report. It is said that the creditors will receive about 30 per cent. of the amount of their claims.

President Winthrop E. Scarritt of the A. C. A. is said to have declined re-election, because of pressure of business. James B. Dill is mentioned as a probable candidate. The election of officers will be held on November 21.

The Eclipse Mfg. Co., of Elmira, N. Y., expect to put on the market for the coming season, a side entrance tonneau car having a 20 h. p. four-cylinder air-cooled motor. It will have a wheel base of 94 inches, and will weigh about 1,200 pounds.

The Watrous Automobile Works of Elmira, N. Y., announce that they will build for next year a small 6-h. p. runabout, weighing about 350 pounds and having a special form of transmission which provides four speeds and reverse.

The Powell Automobile Co., of Omaha, Neb., has begun suit against the Omaha & Council Bluffs Street Railway Co. to recover $1,500 damages, the cost of an automobile which was wrecked when struck by a car owned by the defendant company.

It is said that the Fire and Police Notification, and Auto Parcel Delivery Co., which was recently organized in Toledo, O., have purchased the American District Messenger Service and the Q. Express Co., and will consolidate the three concerns.

F. E. Moskovics, recently with the Continental Caoutchouc Co., is now general sales manager for the Acme Motor Car Co., of Reading, Pa. The company announce that they will build single, double and 4-cylinder models during the coming year.

Leo Milanowski, formerly with the Winton Motor Carriage Co., is now superintendent of construction of The Waltham Mfg. Co., and C. E. Lozier, formerly of H. A. Lozier & Co., of Cleveland, has been appointed sales manager of the Waltham Co.

Four enterprising burglars stole an automobile from a garage in Philadelphia on the night of Oct. 12th and drove in it to Collingwood, N. J., where they blew up the safe in the post office. In their effort to escape they drove the car into a ditch and wrecked it.

F. N. Young, Roy A. Faye and Dr. A. H. Tuttle, of Arlington, Mass., started recently for a hunting trip in Maine in a touring car fitted with a specially constructed body which provides sleeping quarters and sufficient space for carrying camp outfits and supplies of gasoline and provisions.

The Chicago Motorcycle Club held its last meet of the season on Oct. 15 at Garfield Track. St. Croix Johnstone captured both the one hour and the fifteen mile match race for the championship of the club. He covered 44½ miles in the first event; his time for the second was 19:35.

A joint petition asking for better roads out of New York City has been presented to the Committee on Highways and Parks of the Municipal Improvement Commission, by the A. C. A., the Road Driver's Association, and the various cyclists' organizations. A hearing on the matter was granted on Oct. 14th by the Board of Estimate. Chief Engineer Lewis, of the Board, stated that the improvements suggested would cost about $627,500. The petition was held for further consideration.

It is reported in the daily press that the Chief of Police of Egg Harbor, N. J., was nearly run down recently trying to stop the automobile of F. M. Pease who was attempting to smash the record between Philadelphia and Atlantic City on a wager of $2,000. The Chief had been notified by telephone of the approach of the speeding vehicle, and had planted himself in the middle of the road to assert the authority of the law, but was forced to jump for his life. It is stated that the police have the number of the car and that proceedings will be instituted against its owner.

The New England trade is warned against a young man named T. B. Kenneth, who represents himself as a subscription agent of THE HORSELESS AGE. He is a fraud.

George Arents, Jr., who was seriously hurt by the overturning of his car during the Vanderbilt Cup race, is now said to be out of danger and hopes for his complete recovery are entertained.

Side Slip in Motor Cars.

[Paper read before Section G of the British Association for the Advancement of Science, at Cambridge, August 24, by Horace Darwin, M. A., and C. V. Burton, D. Sc.]

In the following an attempt is made to explain one of the causes of the skidding or side-slip of the wheels of motor cars when on slippery roads. This is a serious danger, and it is hoped that the following considerations may be of some value to motor car builders.

It is not an uncommon occurrence for a motor car when on a slippery road to swing round and come to rest facing nearly in the opposite direction to that in which it was moving; and this sometimes occurs when the brake is applied. Let us consider a car moving in a straight line with the brake applied so hard that the wheels are locked. While the wheels were revolving the back part of the car moved far more easily in one definite direction than in any other, and the movement was constrained by the friction between the tires and the ground, but when the wheels are locked the back part of the car can move with nearly equal ease in any direction.

In order to make the problem as simple as possible, let us imagine a car in which half the weight is situated at the centre point between the front wheels, and the other half centrally between the hind wheels. We will also assume that the car is running down an inclined plane in a

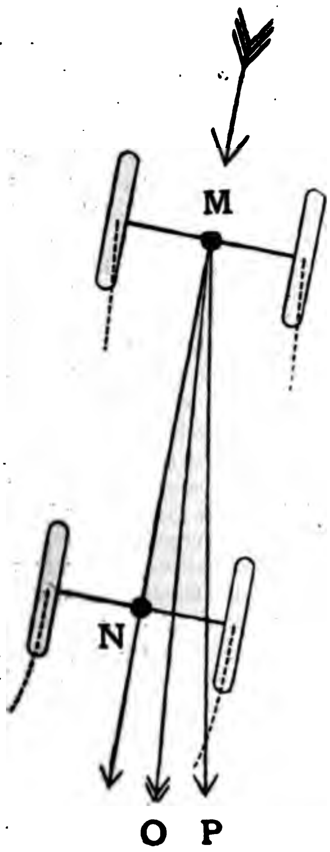


Fig. 1.

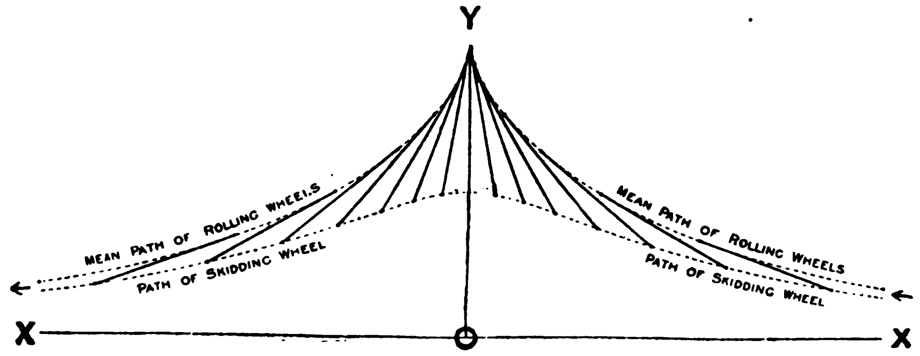


Fig. 2.

direction not quite agreeing with the direction of greatest slope. Suppose M N, Fig. 1, is the direction of motion of the car; M P the direction of greatest slope—that is, the direction in which a ball would roll down the inclined plane. We will also assume that the car is moving at a uniform velocity; that is to say, that the hill is just steep enough to keep the car moving at a uniform speed with the hind wheels locked; assuming that the front wheels have no rolling friction, and that the only resistance to the movement of the car is due to the locked hind wheels. The weight over the front wheels will pull the hind wheels in the direction M N, and the weight over the hind wheels will tend to make the back of the car run directly down the inclined plane, that is, along M P, the line of greatest slope. Thus, the back of the car has a tendency to move in the direction M N on account of the weight over the front wheels, and in the direction M P on account of the weight over the hind wheels, its actual motion being consequently in some intermediate direction, M O. The front of the car will move in the direction M N, as the front wheels are rolling on the ground and the friction between them and the ground will only allow them to run forward. This will at once increase the angle between M N and M O, that is, the angle between the directions of motion of the front and of the back of the car; and the more this angle increases the more rapid will be its rate of increase, until the length of the car is at right angles to the slope; the motion of the car is, in fact, unstable.

We will now suppose that we have a still simpler form of car, with two freely rolling wheels in front and one wheel behind, which is supposed to be locked. In Fig. 2 the mean path of the two free wheels and the path of the one locked wheel are shown, and X O X′ is the line of greatest slope. We will call M N (Fig. 1) the axis of the car; then the lines on the diagram joining the curves show the successive positions of this axis. It is clear that the car is getting more, and more across the hill, finally swinging round so that it reverts toward its original path, but with its axis reversed end for end. No attempt to rectify the side-slip by the steering wheels is supposed to be made. The movement is very nearly the same in a car with four wheels. A model was shown which illustrated the movement in a striking manner.

In an appendix will be found a fuller discussion of this problem. The car may be going down hill very nearly in the direction of maximum slope, but a very slight departure from this direction will be enough to begin the sideways movement of the back of the car, and this will take place, however great is the friction between the wheels and the road, provided only that the hind wheels are locked.

If the front wheels are locked and slip sideways, there is not this tendency to swing round. The rolling hind wheels will follow the slipping front wheels in whatever direction they go, and the motion of the car is, in fact, stable.

All we have shown at present is that a car going down hill at a uniform speed with the hind wheels locked will swing round. We have assumed for simplicity that the speed is small and is neither increasing or decreasing; but if the speed is considerable, or is not uniform, it can likewise be shown that the car will swing round; experiments with the model car as well as theoretical considerations bear this out.

The important consideration in the foregoing is that the hind wheels lose their directive constraint when locked. When rolling on the ground they move much more easily in one direction rather than in any other, but when they are locked, movement in any direction is equally easy. The driving wheels may, on a slippery surface, easily be driven so that they race round, slipping taking place at the point of contact with the ground. When a wheel is racing in this way it loses its directive constraint as much as when it is locked. A similar line of argument to that used in the case of locked wheels will show that the motion of a car with the hind wheels racing is unstable, and that it will swing round.

We have seen that it is the driven and braked wheels which are most likely to lose their directive control and slip sideways, and thus it follows that the danger of swinging round would be greatly reduced by driving and braking the front wheels. It would be easy to make a car in which this was the case if the steering was done by the hind wheels. There are, however,

objections to steering by the hind wheels; in the first place, it is obviously better to lead the front of the car to the right, if you want to avoid an object on the left (which is what happens with front wheel steering), rather than lead the back of the car to the left, which is what would happen in this case with hind wheel steering. Again, with hind wheel steering, if the car is near and slightly facing the curb, it will be impossible to get out of this position without backing. The objections to hind wheel steering are considerable; there are others of less importance, due to the fact that steering by wheel is likely to make it slip sideways, and, as we have seen, all tendency to hind wheel side-slip should be avoided. Suppose the car is moving in a straight course and the steering handle is moved rapidly through a small angle, the track of the steering wheels on the ground will have a correspondingly abrupt bend in it, due to the rapid change of direction; it will take a considerable force to make the mass of the car over the steering wheels thus rapidly change its direction of motion, and this force being applied sideways through the grip of the wheel on the ground, side-slip may result; in this respect hind wheel steering is objectionable.

When a car is moving in a circle the steering wheels are farther from the center of the circle than the other pair of wheels. (See Fig. 4.) The actual velocity of the steering end of the car is greater than the actual velocity of the other end, the angular velocity about the center of the circle being the same for all parts of the car. The steering wheels are for this reason more likely to slip sideways because the centrifugal force is greater. The increase in the tendency to slip from this cause is slight even when turning a corner, and then the speed ought to be slow. The longer the car the greater is the increased tendency to slip from this cause; but it is always small. This is probably only a very slight drawback to hind wheel steering.

These considerations show that there are great advantages in driving and braking the front wheels, and that steering by the hind wheels has decided drawbacks. But it does not follow that the front wheels should be used for all three purposes, because in this case all power of steering would be lost if the wheels were locked or were racing. Lengthening the wheel base has advantages in the case of a front steered and hind wheel driven car. The car, no doubt, is still unstable when the hind wheels slip, but the speed with which the car will swing round is reduced, and by skilful driving the danger is minimized. But with a front driven and hind wheel steered car, increased length does not give this advantage, as the motion of the car is stable; and reducing the length has certain advantages. In turning to the right the back of the car is led to the left, and this objectionable movement is less with a short car; it is easier to get out of an awkward position without backing with a short car; and, as before pointed out, the objection due to centrifugal force is also less in a short car.

There are other arrangements for the wheels of a car; for instance, they can be placed at the corners of an equilateral parallelogram with all the axles parallel to one diagonal. The central pair of wheels is driven and braked, while both front and back wheels are connected to the steering gear. Such a car would be symmetrical as far as the wheels are concerned, and its motion would be stable when the driving wheels were locked or racing. It would be steered by both front and back wheels, and the objections to back wheel steering which we have before considered would be almost entirely removed. There are, undoubtedly, practical objections to this form of car; for example, reduced area of wheel base; it will be understood that stability of motion and convenience of steering are the only points here considered.

But it might be an advantage, in the case of a larger car, to have six wheels arranged on a similar plan; in this case the front and hind steering wheels would be each replaced by two wheels the same distance apart as the central pair of wheels. It would be equally free from side-slip and nearly as convenient to steer; but clearly there are many serious drawbacks to this form of car.

The conclusions we have arrived at are:

1. The usual form of car, in which the hind wheels are driven and braked, is extremely liable to slip sideways, and to swing round and face nearly in the opposite direction to that in which it was moving.

2. A car in which the front wheels are driven and the steering done by the hind wheels is far less liable to side-slip, and if it does slip it will be much less dangerous; but this form of car is less convenient as regards steering.

3. A car in the form of the Mabley car is not liable to side-slip and steers well; but has a wheel base of small effective area, and other practical disadvantages.

4. A six-wheeled car somewhat similar to the Mabley would not be liable to side-slip.

Oldfield vs. Kaiser at Cleveland.

A series of races between Barney Oldfield, with the Peerless "Green Dragon," and Earl Kiser, with the Winton "Bullet No. 2," was the feature of a race meet which was held on Glenville track, Cleveland, Ohio, on Saturday, October 15. The two had arranged a match which was to be decided by the winning of two of three races to be run, the first to be of ten miles, the second five miles and the third, if necessary, a distance to be agreed upon. Oldfield won two races in succession and consequently the match. Incidentally, he established a new world's record for ten miles from a standing start, his time being 9:17 1-5.

It had been decided that a standing start be made in the ten-mile, and a flying start in the five-mile event. At the very start of the first of these Oldfield jumped into the lead, and was at the quarter pole before Kiser had gotten fairly under way. He constantly increased his lead over his rival, whose car seemed to be working badly, and crossed the finish line 42 1-5 seconds ahead. His accumulative times by miles were: 1:07 2-5, 2:54 4-5, 3:49 1-5, 4:44 1-5, 5:39, 6:33 4-5, 7:28 1-5, 8:22 2-5, 9:17 1-5.

In starting the five-mile race the two men slowly circled the track together until they reached the three-quarter pole, where they started at speed for the line. They crossed abreast, but at the word to "go" Oldfield sprang into the lead. At the quarter he led by about 100 feet, at end of the first mile by 300, and at the end of the fifth, by nearly a quarter of a lap. The winner's times by miles were :58 1-5, 1:54 2-5, 2:51, 3:47, 4:43 3-5.

A summary of the other events on the program follows:

Five miles for 24 h. p. touring cars: Webb Jay (White), first; E. S. George (Peerless), second. Time, 6:36 1-5.

Five miles for stock cars 35 h. p. and under: Burman (Peerless), first; Joe Tracy (Royal), second. Time, 5:37 3-5.

Five-mile open handicap: Webb Jay (White), 20 seconds, first; G. E. Turner (Peerless), 20 seconds, second. Time, 5:40 2-5.

Rochester Good Roads Meeting.

The Monroe County Good Roads Association held a convention at Rochester, N. Y., on Tuesday, October 11. After adjournment the officials of the association, the Highway Commissioners and visiting good roads enthusiasts, to the number of about a hundred, were taken on a thirty-four-mile run over the good roads so far completed in the vicinity of Rochester in twenty automobiles belonging to members of the Rochester Automobile Club. The itinerary of the trip had been laid out by County Engineer McClintock, and a booklet had been published by the club containing a map of the route and a description of the roads. The trip was begun at about two o'clock in the afternoon and took four hours to complete, stops being made *en route* for luncheon and for inspection purposes. Among the good roads men who attended the convention and took part in the trip were Frank Z. Wilcox, of Syracuse, vice-president of the Good Roads Association; and Frank Lyon, of Albany, State Inspectior of Improved Highways.

LEGISLATIVE AND LEGAL.

Highspire and Conshohocken, Pa., have recently adopted eight-miles-an-hour automobile ordinances.

The Government has issued a bulletin calling attention to the possibilities of rubber gathering in the Philippines.

The farmers of the Lake Minnetonka region, Minnesota, are planning an organization to act against automobile scorching.

The Common Council of Owosso, Mich., has passed an ordinance restricting the speed of automobiles to eight miles per hour.

Governor Bell, of Vermont, in his inaugural message recommended the passage of an automobile law based on that of Massachusetts.

The City Council of Elgin, Ill., has been called upon to pass an ordinance prohibiting the dripping of oil from automobiles on to the asphalt pavements.

A bill has been presented to the Legislature of Vermont which forbids the use of automobiles on public highways between the hours of noon and midnight.

The City Council of Buffalo, N. Y., is about to draw up an automobile ordinance which will not conflict with the State motor vehicle law, the State cycle law and the city charter.

Judge Swartz, of Norristown, Pa., has ruled, in the case of David Garber, that bursts of speed to avoid collisions with other vehicles cannot be considered as violations of the law.

The Police Commissioner of Bay City, Mich., has asked the Council to amend the automobile ordinance so that the speed of cars shall be limited to three miles per hour when turning corners.

Judge Heard, of the Circuit Court, sitting at Sterling, Ill., has declared that an ordinance restricting the speed of automobiles to six miles an hour is unreasonable and oppressive and therefore unconstitutional.

According to the Brooklyn, N. Y., *Eagle*, 84 arrests for speeding have been made in Suffolk County, L. I., since July 1. The total of fines paid amounts to $1,372; fees, $430.48, while the rewards claimed aggregate $1,950.

In the case of W. J. Campbell, of Oskosh, arrested for speeding, Judge Goss held that the ordinance is valid, but he failed to find evidence sufficient to convict Campbell. The validity of the ordinance has been questioned by automobilists.

Judge Emmons, of Boston, has lately taken occasion to warn antomobilists that if it is shown that they have endeavored to get away after a collision of any kind, the case will be presented to the State Highway Commission in an effort to have the license revoked.

The suit of Richard Siegman against the Electric Vehicle Co and Martin Maloney, involving alleged irregular payments of dividends by the company, has been removed from the Court of Chancery to the United States Circuit Court for the District of New Jersey.

In the case of Dr. G. S. Gerhard, of Ardmore, Pa., who pleaded guilty to exceeding the speed limit, Judge Weand, of the Montgomery County Court, suggested that if the doctor could prove that he was on a life and death errand at the time, the sentence would be mitigated.

The County Court of Grant County, W. Va., has passed an order prohibiting the running of automobiles in the county because "injury to both the person and property of some of its citizens has been sustained." The order states that the public sentiment of the county is against the running of automobiles on its highways. The several superintendents and surveyors of roads are directed to strictly enforce the order. Any violation is subject to $100 fine.

Club Notes.

PITTSBURG A. C.

Counsel for the Club has announced that the club will pay a reward of $250 for the arrest of each person speeding beyond the legal limit.

RHODE ISLAND A. C.

An invitation has been extended to the New Hampshire A. C. to make a club run to Providence and be the guests of the Rhode Island Club during their stay in the city.

NEW HAMPSHIRE A. C.

Officers for the coming year have been elected as follows: President, Reginald C. Stevenson; vice-president, Arthur H. Sawyer; treasurer, Charles G. Sheldon; secretary, Willard M. Jenkins; directors, the above named and George E. Kent.

NEW BRITAIN (CONN.) A. C.

Officers were elected and organization perfected at a meeting held in the rooms of the Business Men's Association last week. The officers are: President, Philip Corbin; vice-president, Howard S. Hart; secretary, W. L. Hatch; treasurer, H. S. Damon.

ROCKFORD (ILL.) A. C.

The committee in charge of the financial end of the race meet which was recently promoted by the club have reported that a profit of several hundred dollars was made. Plans are being made for a similar meet to be held in the spring.

Members of the club and visiting automobilists who attended the race meet on October 7, were entertained during the evening at the home of G. L. Woodruff.

TACOMA (WASH.) A. C.

Organization was effected at a meeting held on October 6, and the following officers were elected: D. D. Pickerell, president; Frank Allyn, Jr., secretary; C. M. Seeley, treasurer; George F. Bulen, C. N. Gardner, C. Uzafovage, Dr. F. A. Scott, and E. R. Wheeler, trustees. D. W. Perry and D. W. King are also charter members. Mr. Pickerell is to make an extended trip through the East and will visit a number of clubs. Upon his return, by-laws will be adopted.

A. C. A.

A reception was given on October 11 to the foreign motorists who had come to this country for the Vanderbilt Cup race. An address was made by President Scarritt, in which he recommended that at the race next year better facilities should be provided for keeping the spectators clear of the course at the start and finish. Among the foreigners present were Albert Clement, Dominick Lamberjack, Paul LaCroix, and Harvey du Cros. Leters of regret were read from Heath, Teste and Tarte.

At a meeting on Tuesday evening, Oct. 18th, the topic for discussion was "Automobile Racing in Europe." The guests of the evening were M. Leon Thery, this year's winner of the International Gordon Bennett Cup Race in Germany, and M. G. Caillois, who was fifth in the French Elimination trials for the Gordon Bennett Race this year, and winner in the Caillon Hill Climb of 1902. The formal lectures of the season will not begin until Tuesday evening, Nov. 8th.

New Incorporations.

Chemung Automobile Club, Elmira, N. Y. Capital, 5,000. Incorporators, F. H. Rice, W. Ufford, C. R. Sayles.

Garfield Automobile Co., Chicago. Capital, $15,000. Incorporators, N. E. McDaniels. George Schein, Justus Chancellor.

Neal, Clark & Neal Co., Buffalo, N. Y. To deal in automobiles. Capital, $7,500. Incorporators. O. L. Neal, H. B. Clark, B. E. Neal.

Automobile Supply Mfg. Co., Albany, N. Y. Capital, $15,000. Incorporators: Salvatore Salvini, Errico Pascucci, Louis Rubes.

Original Automobile Supply Co., St. Louis, Mo. Capital, $10,000. Incorporators: A. L. Dyke, Carrie Dyke, Chas. Peters.

Electric City Motor Co., Lynn, Mass. To manufacture gasoline motors. Capital, $2,500. Incorporators, Samuel Bouton, J. H. Madden, J. J. Lennon.

Wayne Gear & Machine Co., Fort Wayne, Ind. To manufacture automobile gears and transmissions. Capital, 10,000. Incorporators, Maurice I. Rosenthal, Joe Freiburger, Louis Frankel.

Schwarz Motor & Tire Truck Co., Detroit, Mich. To manufacture fire apparatus. Capital, $25,000. Stockholders, Carl Schwarz, William H. Drittler, William J. G. Mourer, Byron J. Hart, Fred P. Obenauer, William C. Bryant.

MOTOR VEHICLE PATENTS.

United States Patents.

772,123. Lead Containing Cell for Secondary Batteries.—V. G. Apple, of Dayton, O. October 11, 1904. Filed June 3, 1903.

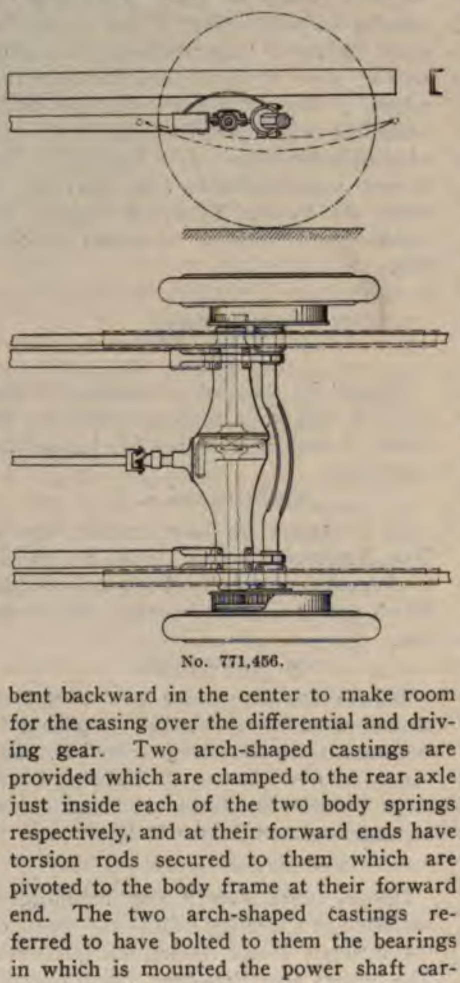
In the production of a containing-cell for a storage or secondary battery, particularly those designed for employment in motor-vehicles lightness and strength of the cell structure are of paramount importance. It is also obviously desirable that the interior surface of the cell be so formed that the cell may serve as one of the active elements of the completed battery, and if the cell is to be of the "pasted" type that projections be formed upon the interior surface of the cell so shaped as to afford the most efficient support to the active material to prevent the same from jarring loose and sluing off when the cell is transported from place to place. The present inventor therefore provides the inner surface of an integral lead cell with vertical dove-tail slots to contain active material.

771,929. Brake for Vehicles.—Otto F. Persson, of Lynn, Mass. October 11, 1904. Filed May 21, 1903.

The brake is of the internal expanding type, and acts on a drum secured to the hub of the road wheels. The upper half of the axle bearing-box forms a spring-seat. The lower part of the bearing-box is provided with a depending supporting-arm adjacent the end near to the brake-drum. To this arm are hinged symmetrically-disposed brake-shoes, arranged within the brake-drum and adapted to frictionally engage the inner surface thereof. The brake-shoes are constructed of ribbed semi-circular plates, and upon the curved surface of these plates are secured segmental friction-pieces of wood. The upper free end of each shoe-plate is provided with a boss, interiorly threaded to receive the threaded stem of an adjustable cam-engaging member or plate. These plates are of square form, so as to provide side surfaces adapted to engage with the vertical wall of the head of the brake-drum and be prevented from turning thereby. These members can be adjusted after removing the driving-wheel when they are free from the drum, so as to screw in either inward or outward direction. Between the cam-engaging members is arranged a cam formed on a shaft mounted in a bearing-plate forming the top plate for the vehicle-spring and secured by means of clips. To the end of cam-shaft opposite that of the cam is rigidly secured an offset arm which connects with the foot-lever mechanism of the automobile in the usual manner. Normally the friction blocks are held away from the surface of the brake drum by a coiled spring.

771,456. Suspension Device for Differential Gearing. A. E. Brillié, of Paris, France. October 4, 1904. Filed December 29, 1903.

The differential gear is mounted on a driving shaft arranged in front of the rear axle. The car has a stationary rear axle which is

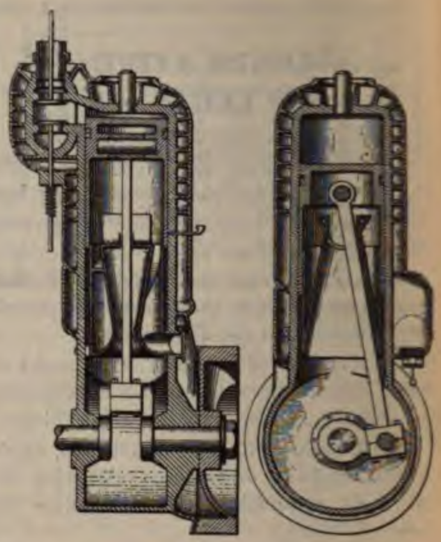


No. 771,456.

bent backward in the center to make room for the casing over the differential and driving gear. Two arch-shaped castings are provided which are clamped to the rear axle just inside each of the two body springs respectively, and at their forward ends have torsion rods secured to them which are pivoted to the body frame at their forward end. The two arch-shaped castings referred to have bolted to them the bearings in which is mounted the power shaft carrying the differential and bevel driving gear at its center. The power shaft is provided at its ends with spur pinions meshing with internal gears secured to the road wheel hubs. A special feature of the invention is that an eccentric bushing is inserted between the stationary axle and the sleeve on the arch-shaped casting, by means of which the mesh of the gears can be adjusted.

772,178. Cooling Mechanism for Explosive Engines.—Frank Reaugh, of Oak Cliff, Tex. October 11, 1904. Filed May 8, 1903.

The cylinder is formed with a jacket which extends over the valve-casing, and has openings at its top, one for the body of the cylinder and one for the valve-casing.



Within the jacket are arranged spiral walls which form one or more air-passages running around the valve-casing and cylinder, these passages leading into the lower end of the jacket. A blast of air is forced through these passages by the fan action of the fly-wheel spokes and the pump action of the piston on its downward stroke, a cylindrical box being fitted inside the lower end of the engine cylinder to produce a more effective pump action. The communication between what might be called the pump chamber and the air passage, and also between the fan housing and the air passage, is controlled by a flap valve.

772,160. Explosive Engine.—C. W. Little, of Lincoln, Neb. October 11, 1904. Filed June 3, 1903.

771,919. Clutch.—D. A. Murphy, of Montreal, Canada. October, 11, 1904. Filed April 8, 1904.

771,881. Vaporizer for Oil-Engines. Dudley R. Morrison, Hartford City, Ind. October 11, 1904. Filed Jan. 25, 1904.

771,882. Lubricator. John W. McClure, Detroit, Mich. October 11, 1904. Filed Aug. 11, 1903.

771,892. Intercepting-Valve. Augustus A. Ball, Jr., Lynn, Mass. October 11, 1904. Filed June 5, 1902.

771,945. Wheel for Traction-Engines. Daniel T. Spry, Pymosa township, Cass county, Iowa. October 11, 1904. Filed April 28, 1904.

771,947. Vehicle-Tire. James A. Swinehart, Akron, Ohio. October 11, 1904. Filed Nov. 23, 1903.

771,985. Carburetor for Gasoline-Engines. George Kingston, Kokomo, Ind. October 11, 1904. Filed Aug. 12, 1903.

772,025. Air-Pump. John H. Burkholder, Ashland, Ohio. October 11, 1904. Filed Sept. 24, 1902.

772,030. Apparatus for Loading Motor-Vehicles. George H. Condict, New York, N. Y. October 11, 1904. Filed Jan. 3, 1899.

772,069. Metal Securing-Rim for Elastic Wheel-Tires. John M. Sweet, Batavia, N. Y. October 11, 1904. Filed March 7, 1904.

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Suspension from Club Membership for Speeding.

The Automobile Club of America has at last given some proof of its sincerity in the passage of its several resolutions against speeding by suspending from membership a young man who has made himself notorious by attempting long distance record runs and getting himself interviewed on the subject. The action of the club was taken none too soon. The offense which undoubtedly was the cause of the suspension was committed as long ago as last June, and the details in connection with it were given such wide publicity at the time that they could not have failed to come to the attention of the club authorities. A premeditated race of this kind over country roads in defiance of speed laws is certainly a most serious offence, and with no action taken in this matter the club's recent resolution declaring hired chauffeurs to be mainly responsible for speed excesses seemed rather an attempt to dodge the duty of holding its own members responsible for their behavior on the road. By its suspension of the offending member the club has to this extent "made good," however, and this is cause for congratulation. Other clubs should be encouraged to follow the example and deal summarily with habitual and flagrant speed law violators. It is a discredit to any club to count among its members persons wilfully disregarding the reasonable law of the land, even though they may be of high rank in the social and financial world, and before a club can accomplish much good in overcoming public antagonism to the automobile, which is one of the avowed objects of nearly all such organizations, it must see to it that its own members are not habitually giving cause for such antagonism by unlawful or uncivil behavior on the road.

On Grease Lubrication.

There would seem to be an urgent need for an efficient automatic means of continuously feeding semi-solid lubricants to the various bearings of an automobile, if these materials are to be extensively used as a substitute for liquid oils. No such device is yet known to be upon the market, except the small spring-fed grease cups designed to be placed directly upon the bearings to be supplied. These depend somewhat upon the softening of the grease by functional heat, afford no visual indication of their action and are not adapted to the certain supply of several bearings from a common point through tubes of considerable length. In other words, the system of grease lubrication, as at present generally installed, embodies no automatic, visually indicated, central feeding device, which, in point of convenience, certainty and completeness, compares with the automatic magazine lubricator designed to force fluid lubricant not only to the bearings but to the cylinders as well. As usually arranged, the grease lubricating system comprises quite a multiplicity of small, manually-operated cups, mounted upon the bearings they are supposed to lubricate, and hence located, in many instances, in extremely inaccessible places. Such grease cups are not arranged to be operated from the driver's seat, require individual filling and supply their lubricant only while they are sufficiently turned down by the operator. In the attempts which have been made to lubricate crank shafts and crank pins with solid lubricant the engine actually has to be stopped in order that the supply of lubricant may be renewed. One result of this method of lubrication is that bearings are in many instances fed fitfully and at long intervals. An operator hardly cares to stop his car merely to turn up the grease cups,

and as long as it continues to run properly there is a strong temptation to defer the somewhat unpleasant and uncleanly operation. This is specially the case on long runs, and it must be admitted that it is rather a "cross'" to the average operator to be forced to shut down his engine at intervals in order to lubricate its cranks. The tendency is to run a little further and still a little further before the needed stop is made. A thoughtless or procrastinating operator may altogether forget the necessity of dealing with these grease cups or delay it until some damage has been done. When the cups are mounted upon the dash and connected with the bearings by means of individual tubes, the conditions are very much bettered. They may be operated without stopping the car, and, not being out of sight, are not entirely out of mind. On a long run it is often rather a pleasure than otherwise to have some little task to do, such as screwing down the dashboard cups, in order to relieve the monotony of the normal operative duties of the car.

Reduced loss of lubricant to external surfaces of the car mechanism, and the resulting increased degree of cleanliness of operation have been the chief claims hitherto made for grease lubrication, but it is decidedly open to argument whether these advantages can equal the disadvantages which arise from the present unhandy, uncertain and cursory manner in which grease is applied in the actual average operation of a motor car. If a purely mineral grease can be adopted, infallibly fed to all lubricant-requiring portions of the car by a central, visually indicating, automatic device, it may be that the virtues of the two systems of lubrication may be combined, but extended practice will be required to determine whether a semi-solid lubricant is actually so good as a mobile oil which seeks, by capillary action, every portion of a bearing and which requires no externally applied force to distribute it.

Heating of Auto Houses.

Although a great many cars are stored away and not used during the winter months, particularly in the northern section of the country, most automobilists will want at least an occasional ride as long as the roads are in fair condition, which may be until the end of the year, or even longer. There is likely to be a good deal of cold weather during the intervening period, and some suggestions regarding the care of cars in freezing temperatures are therefore timely.

A car that is in almost continuous operation during the winter should be kept in a heated house, for when it is kept in a cold building all the bearings and joints become so stiff that the car will run much harder than usual for some time after it is taken out. The motor may also give difficulty in starting, as with the inlet passage and cylinder walls at freezing temperature, the gasoline will not vaporize, and consequently not ignite.

Quite a number of automobilists keeping their cars on their own premises heat their houses by means of a coal stove. While this can be done, there is obviously a good deal of danger involved in an open fire in a room containing a car charged with gasoline; for, if the gasoline tank should ever become leaky without the owner's knowledge, an explosion would be almost certain to result. The careful automobilist will not run such risks, but will provide heating means which obviate such dangers. Obviously when the auto house is located near a building with a steam, hot water or furnace heating system, the problem is a comparatively easy one, as radiators or flues are then readily installed in the auto house and connected with the heating system of the building. Where the owner's residence is not equipped with any of these modern heating systems, and where the installation of such a system is impossible, or inadvisable for any reason, the auto house must necessarily be heated by means of a stove. In such a case we consider it advisable to locate the stove in a partitioned-off corner of the house, or in an addition thereto, and to simply lead the heated air from around the stove through the room containing the car. With such an arrangement, it is absolutely impossible for inflammable vapors to reach the stove, and all danger of fire or explosion is eliminated. The heating efficiency of the stove under such conditions may not be so great as if it were placed directly in the auto house, but the room to be heated is in any case small and need not be kept at a very high temperature, hence this matter is of little moment.

The Press and Road Racing.

Since the race for the Vanderbilt Cup, all the daily papers in New York city and, in fact, in all parts of the country, have assumed a stand against road racing, declaring it to be an encroachment on the rights of the public and a menace to the legitimate use of motor vehicles. About the only exception is the New York *Herald*, which has a pet race of its own to promote and could therefore hardly be expected to decry "the sport." Many of the papers point out that if the American Automobile Association really seeks to encourage the practical use of automobiles and overcome the many obstacles to the introduction of the new means of conveyance, it should above all avoid rousing public opposition by monopolizing or endangering the public roads. This almost unanimous opinion of the press unquestionably reflects the feelings of a great majority of the people, and it would therefore be well for the "sports" to heed the warning in time.

Automobiles in the Campaign.

The example set by Tom L. Johnson, of Ohio, last year, in making a stumping tour of the State in a gasoline touring car, is being followed by many politicians during the present campaign. As compared with the train, the automobile is a great convenience, and admits of reaching the most inaccessible towns. The "tonneau orator" will be a pleasing variation from the car platform orator, and in the smaller places, particularly in the West, the novelty of a big touring car will be an effective aid to the oratorical talents of the spellbinder in drawing a crowd. There is one thing in this connection, however, that has been somewhat perplexing to campaign managers, and that is, what would be the effect of the use of the "devil wagon" on the disposition of the farmers toward their candidate? It is evident that it is particularly the farmers and inhabitants of small country towns who can be most conveniently reached with the motor car, and the inherent ill-feeling of large portions of the country population toward autos might be inimical to the success of an auto stumping tour among them. But the conclusion seems to have been reached that by showing the ordinary courtesy (or even a little more) to farmers in passing teams on the road, the auto might even be made a means of gaining their friendship and esteem, and thus prove doubly useful for campaign purposes. As a matter of fact, automobiles are used for campaign purposes in all parts of the country, from Maine to California.

It is also quite probable that on Election Day the automobile will prove useful in carrying tardy voters to the polls. Much has been said in regard to the apathy of the campaign. Politicians are finding it a difficult task to instil into the voters the old-time enthusiasm, and on the decisive day many of the more apathetic ones will probably need strong urging to do "their duty as citizens." It will, no doubt, prove a busy day for auto renting establishments, and it would not be surprising if renting rates should temporarily advance.

Anti-Speeding Crusades.

Crusades against reckless driving have recently been inaugurated in many of the larger cities of the country, partly by the police authorities on complaints from the public, partly by the automobile clubs. In Detroit, where there are about a thousand cars, mostly of the runabout class, it was found necessary a short time ago to pass an emergency ordinance against speeding. In the discussion, a city official stated that he knew the great majority of automobilists to be careful and conscientious drivers, but that there were among them about 5 per cent. of irresponsible scorchers who brought the whole class into disrepute and made necessary the ordinance under consideration. He also pointed out how advantageous it would be to automobilists if they could devise means to stamp out the speeding craze themselves, thus avoiding the necessity for police interference.

It would, indeed, be a blessing if it were within the powers of automobilists to keep their ranks free from lawbreakers, but this they will be hardly able to do. Automobile clubs can, of course, discipline or expel members who have been convicted of illegal speeding, but even if they should strictly carry out their resolutions we believe it would have but little effect upon the speed craze. On the other hand, the enforcement of the law is the duty of the police, and cannot be intrusted to social organizations, as was pointed out by the Chief of Police of Chicago lately. The Detroit idea, therefore, appears rather utopian.

Resolutions against speeding have recently been adopted by the automobile clubs of Cleveland and by the Automobile Club of America, and the Pittsburg club has even offered a reward of $250 for the arrest and conviction of speed offenders. In Pittsburg the feeling of the public seems to be particularly aroused. Announcement has been made by the Chief of Police that he will put forth his utmost efforts to protect the public against reckless drivers, and that policemen who fail to arrest speeding chauffeurs will be suspended from duty, and on second offense dismissed from the force.

There appears to be a regular season for the outbursts of public indignation which reaches its height during the fall—unfortunately shortly before the opening of legislative sessions. While it is true that some speeding is indulged in all through the summer, the public bears up with it for a certain time, but in the fall the number of complaints swell to such a volume that police departments are compelled to issue instructions to strictly enforce the speed law.

Shadows of a Chauffeur's Life.

Most of what has been written about hired chauffeurs has been uncomplimentary to the profession. It can be said without fear of contradiction that as a class chauffeurs do not stand high in public esteem. Certain features of the position, such as the unusual amount of leisure, and the opportunities for dishonest dealings, are instrumental in attracting questionable characters to the profession, and the leisure and good income, often increased by dishonorable practices, are direct inducements to a life of dissipation. Old experienced employers of chauffeurs usually tell tales of insobriety and dishonesty on the part of their employees. The foreign chauffeurs are of special ill-repute, and Alfred Harmsworth probably struck the nail on the head when he said, in a recent interview, that most of them had left their country for their country's good.

It would be entirely wrong, however, to assume that all chauffeurs, or even a majority of them, are morally deficient. There are among them many good and honest, as well as competent, men, and that these have not yet succeeded in ridding the profession of its dishonest and dissipated members, is due largely to its newness and the fact that the demand for competent drivers exceeds the supply. A good position as chauffeur offers many inducements to the young machinist, and many are anxious to fit themselves for it, but, on the other hand, it has its dark side as well, and competent machinists familiar with the conditions frequently prefer regular work in their trade. Although good salaries are paid, employment as a rule is not very steady. The driver is required to be on duty Sundays as well as week days, and in many cases the hours of duty are long and irregular. It is particularly onerous to drive for an employer possessed with speed madness, and when the police stop a car for speeding, they invariably arrest the driver, who may be only acting under orders. In court, if only a fine is imposed, it is, of course, paid by the owner, but if the judge takes a notion that an example should be set, the chauffeur goes to jail. Some owners of fast cars also require their chauffeurs to drive for them in races, or to accompany them on such occasions as mechanics, which may be entirely against the chauffeur's inclinations, but cannot well be refused, as it is considered part of his regular duties. For instance, it is hardly to be presumed that the chauffeur of young Arents, who was killed in the recent Vanderbilt Cup race, was particularly anxious to participate in that race, but he consented to it as one of his duties and as preferable to losing his job.

New Auto Law Proposed in Italy.

A special commission consisting of Senators and Deputies, the Mayor of Rome and a number of other officials, as well as automobile owners, which was appointed recently by the Italian Minister of Public Works to inquire into the question of regulating the speed of automobiles, has presented a report, which will soon be laid before the Cabinet. The Commission makes two leading recommendations. The first of these, which is to apply to all kinds of vehicles alike, is to the effect that road vehicles should always keep to the right-hand side of the road; but in order not to break with ancient custom, mayors of cities of over 20,000 inhabitants may issue decrees permitting the vehicles to be driven on the left hand-side, in accordance with the present rule. It has frequently been observed by travelers that in Italy the rule of the road is honored more in theory than in practice. The recommendation pertaining specially to automobiles has relation to speed limits, and proposes a reduction of the limit in towns and villages from 15 to 12 kilometers (7½ miles) per hour, and to abolish speed limits entirely for the open country. It is further proposed that in addition to the identification plate carried at the rear of the car, a plate shall also be carried at the front of the vehicle.

It is well to remember that blue smoke in the exhaust indicates an excess of lubricating oil in the cylinder, while black smoke indicates an excess of gasoline.

Carburetor Troubles and Their Remedies.

By Albert L. Clough.

The carburetor, when well adapted to the motor which it is to supply, and given a correct initial adjustment, is one of the least troublesome elements of the automobile mechanism. Ordinarily it will perform its service continuously and uniformly for long periods of time without requiring attention, and it is too often blamed for faults in engine operation which should be attributed to defects in the ignition system. In searching for the cause of irregularity of action in an automobile motor, the sparking arrangements may generally be profitably scrutinized with the utmost care before investigation proceeds to the carburetor. Of course, there are certain symptoms which point at once to carburetor trouble, such as black smoke in the exhaust, or fouled plugs, but in cases where there is no obvious sign, such as the above, the carburetor may wait for its inspection until all electrical features have been most minutely examined. Faithful as the carburetor usually is in the performance of its prescribed duty, there are certain derangements to which it is subject, the same as with all mechanisms.

GASOLINE LEAKS.

Every user of an automobile should be very watchful concernig the possible development of gasoline leaks on his car, and an occasional glance under the machine, when it is at rest, with the engine stopped and the gasoline still turned on, may prove profitable. Gasoline leaks are to be avoided not only on account of the loss of valuable fuel. but on acount of the fire danger which they involve. A glance under the supply tank will at once show whether it has become leaky, through the opening of its seams, by jarring, or whether the union connecting the gasoline pipe to the tank is leaking or not. The tanks of some low grade machines are made of galvanized iron. When this is the case, the drops of water which are almost inevitably taken in with the fuel, remain upon the tank bottom and finally rust it through. When a leak due to this cause has developed, it is practically no use to solder it, as other holes will appear in a few days. The tank might as well be discarded and one strongly made from heavy-gage copper substituted for it.

HOW TO PREVENT LEAKS.

The gasoline pipe may well be examined for leaks, as may be the union which connects it to the carburetor float chamber. This pipe should have sufficient slack in it to prevent its being strained under any conditions, and may well comprise a coil, of one or two turns, to render it flexible under the strains of service. It should not be so placed as to come in contact with any other part of the mechanism which might abrade and in time nick it, so as to cause it to leak. If either of its unions are found to leak, they should be disconnected, the ground surfaces wiped perfectly clean and given a coating of white soap, which will be found to stop light leaks. If, however, this expedient is ineffectual, the bearing surface will have to be ground in with fine emery and rouge or whiting. The soldered connections of the gasoline pipe to its unions will bear watching from time to time.

REPAIR OF LEAKY PIPES.

A leaking or broken gasoline pipe is a rather annoying accident to be met with on the road, but it may be temporarily repaired by cutting out the leaky portion and joining the severed ends by means of a short length of rubber tubing of suitable size, the connecting ends of the rubber being held by wire winding to their respective ends of the copper pipe. In the absence of a soldering iron for making a permanent repair, or of rubber tubing, one may be able to drive a few miles with the following makeshift: Take narrow strips of cloth, torn from a handkerchief, soap them well and wind tightly over the junction of the broken ends, which may first have been filed off squarely; then take adhesive tape and wind firmly over the cloth, beginning at quite a distance beyond it in each direction.

PUNCTURED FLOATS.

When the car has been at rest for a short time with the gasoline left turned on, there should be no drip from the carburetor. If it is found that gasoline is still dripping from a float feed carburetor, it requires attention. A large proportion of manufacturers are now using cork for the material of their floats, as being more reliable than the hollow metal ones. These latter sometimes develop minute leaks, partially fill with liquid and lose so much of their buoyancy that the gasoline level in the float chamber is maintained above the level of the top of the spraying standpipe. This permits a constant loss of fuel when the car is standing. The presence of liquid inside a metal float may at once be detected by the sound when it is shaken, but the leak through which it entered is usually so minute that the liquid cannot escape through it, and is too small to be detected by the eye. If the float is heated slightly, so as to partially vaporize the liquid within it, and the flame of a match is passed over the float's surface, the hole will be discovered by the ignition of the issuing vapor. After marking the leak a hole should be punched in the float with an awl to allow of the egress of the contained liquid, and both holes should then be carefully soldered.

IMPERFECT SEATING OF GASOLINE VALVE.

If the float is found tight and in good condition the cause of the constant flow of fuel is probably the failure of the needle valve to seat tightly under the influence of the float. Unless the carburetor is mounted with the float chamber truly horizontal, this is very likely to happen. The leak may usually be stopped by grinding this valve into its seat with a little whiting, or even grinding the seat and valve together without any abrasive, holding the needle and seat in their true relative positions and giving them a motion of rotation with moderate pressure.

NO FLOW OF GASOLINE.

Sometimes, instead of an excessive supply of gasoline passing the carburetor little, if any, will flow, even when the carburetor is flooded in the accustomed manner. It may be that a sufficient quantity of impurities has gathered upon the wire gauze filter, which is usualy placed in the supply orifice of the float chamber. This may be opened to inspection by freeing the union of the gasoline pipe to the chamber and the gauze can then be readily cleansed. Some impurity may have worked its way through the gasoline passages and become lodged in the needle valve or other measuring device which allows the gasoline to reach the mixing point. In this case the needle should be entirely withdrawn and cleaned, and its seat flushed out by causing gasoline to run through it freely upon depressing the float. There is no need of losing the adjustment in doing this, as after the set screw which locks the adjustment is loosened the needle may be turned down to a completely closed condition and the number of turns required may be noted. This will give the necessary data to make it easy to effect the old setting when the parts are put together. In order to avoid the possibility of foreign matter finding its way into the passages of the carburetor, it is well to occasionally draw off the float chamber through the plug in the bottom, which is always provided. By depressing the float when the plug is out, gasoline may be flushed through the chamber, carrying with it all remaining sediment.

GASOLINE SHOULD BE STRAINED.

In regard to this matter of impurities in gasoline, it may be said that all trouble arising from them may be averted by the use of a chamois filter in the funnel when the tank is filled. This will stop not only solid particles, but will successfully exclude all water which the gasoline may contain. There is a great deal of talk about gasoline containing water, as if the two liquids were capable of being mixed, so that the water became impossible of detection and likely to affect the running of the motor in some obscure manner. Water, as the well informed motorist knows, will no more mix with gasoline than it will with oil, and if any water is present in a vessel of gasoline, it will be perfectly apparent in the form of globules collected on the bottom. If the gasoline tank be filled from a can having a faucet, there will be no danger of water escaping from the filling vessel with the gasoline, as the former will seek the bottom of the can below the level of the faucet. If the tank is filled from a measure, the water, if any, is readily seen on the bottom, but if the gasoline is poured in from a can which has no faucet, the water, if present,

is likely to be emptied out with the gasoline, but will be caught by the chamois or fine wire-gauze strainer if one be used. Fine solid particles or dissolved gummy substances are the impurities in gasoline which are most difficult to guard against. Water is easily avoided, as it is so easily detected. Some gasoline tanks are fitted with a settling pocket, which forms the lowest point of the tank. Water and solid particles are supposed to gravitate into this, and it should be drawn off occasionally by means provided therefor. The gasoline outlet from the tank is sometimes fitted with a strainer, and occasionally this should be cleaned to prevent its becoming clogged.

FREEZING OF CARBURETOR.

When water is allowed (through carelessness) to enter the float chamber, it creates special trouble in cold weather. It will settle into the recess in the bottom which forms the guide of the float stem and when it freezes will prevent the action of the float. If it enters the passage leading to the jet it will stop it up completely when it congeals, as it may readily do under favorable conditions. Most carburetors take in their air through some sort of a strainer, with the intention of excluding from the engine particles of dust and other materials. Sometimes this strainer is a fine wire gauze and sometimes it is a loosely woven fabric. These strainers need cleaning occasionally so that the air may not be unduly throttled. A fabric strainer may be washed in gasoline and all foreign material thus removed.

When a carburetor is rather small for the gas which it has to supply it becomes very cold while in operation, as the heat called for to effect the evaporation of the gasoline is more than that available from the entering air or than can be secured through the metal of the carburetor from the outside air by conduction. The metal of the carburetor is very often reduced in temperature to a point below the dew point of the surrounding air and a large amount of water condenses upon it. Under extreme conditions the moisture is deposited in the form of white frost, which evidences a temperature within the carburetor low enough to preclude the successful use of low test fuel and possibly to affect the intimacy of the resulting mixture even when high test gasoline is employed. If any water is present in the float chamber, it will be likely to freeze and disturb the action of the carburetor.

USE OF HEATED AIR.

When these conditions exist, one will do well to make arrangements to take heated air for the mixture if this has not already been provided for. This may be accomplished by making the outside end of the air inlet pipe terminate very closely to the muffler or some other hot portion of the car, so that the air which is sucked in may have obtained a considerable increase of temperature from contact with the hot metal. Other methods of securing warmed air will readily suggest themselves, such as taking the air from a sheet iron casing surrounding the exhaust pipe.

ADJUSTMENT.

As to the matter of adjustment, only general statements can be made, as there is so great a variety of carburetors on the market. One adjustment, however, and the most important one, is common to them all, namely, that of the needle valve which regulates the flow of fuel to the spraying jet. Carburetors which possess automatic damper air valves or air valves which are interconected with the gasoline valve vary in their individual arrangements so widely that the following of the directions which accompany them is the only practical course. The main point in the handling of almost any carburetor is this adjustment of the gasoline supply. A good method to effect it is as follows: Be sure that the ignition apparatus is in perfect order. Open the muffler, or, still better, disconnect it, so that the exhaust flame may be seen. See that the spark is set not earlier than the dead center and that the throttle is open a little, and with the gasoline adjustment open a fraction of a turn, the gasoline supply valve open and the carburetor flooded; have the engine cranked by another person while the gasoline adjustment is being opened very gradually. When explosions commence and the engine is fairly running, the adjustment should be so regulated that the engine shall give an exhaust flame of a deep, rich blue color. If its color is a lurid red, accompanied by black smoke, it is evidence that too much gasoline is being fed, while if the exhaust flame is small and pale—almost a yellowish green—there is an excess of air. The sound of the exhaust will also give the practical ear some idea of the quality of the mixture. Where the charge is too rich the sound is more like a puff than like a detonation; when too weak it is sharp, but with a hot, low tone, and when the mixture is correct and the exhaust unmuffled, the sound has the peculiar indescribably sharp "smacking" sound of beating together two pieces of wood.

ADJUSTMENT OF AUTOMATIC CARBURETORS.

If the gasoline adjustment is made with a nearly closed throttle the latter should now be opened widely. With an "automatic" carburetor the mixture should still prove correct at this higher speed, but it may be actually too rich, in which case provision for the entrance of more air through the automatic damper valve or mechanically controlled auxiliary inlet should be made. Adjustment should not be regarded as perfect until a good mixture is obtained at all degrees of throttling, as judged by the character of the exhaust flame and the activity of the engine. With many carburetors which are not fitted with automatic air supply, the best that can be done is to secure such an adjustment as will give a perfect mixture at full throttle opening, even though it is slightly defective under nearly closed throttle. Making the carburetor adjustment with the engine running light, is far from satisfactory. With full throttle opening the motor speeds up to a rather distressing extent, even when the spark is somewhat retarded, and this racing is not particularly good for it. The running condition during which it is most imperatively desirable that the mixture should be perfect is when the engine is operating under fully-opened throttle and heavily loaded, as when climbing a considerable grade on the high gear. Also, when the engine is racing it is very difficult to detect a single missed explosion, and one is always in doubt after a test of a motor running light whether it would do good work at low speeds.

ADJUSTMENT FOR FULL POWER.

If the motor is not too large this difficulty may be met by arranging a crude brake, formed of a piece of board or plank held forcibly in contact with the face of the fly-wheel. When this brake is in application the motor speed may be kept very moderate, even under full throttle, and with the usual spark advance, and conditions for adjusting the carburetor may thus be realized which somewhat approximate to practice. The engine is not so badly "racked" when running under this brake control, missed explosions are easily detected at the lowered speed and some idea can be gained as to whether the motor is "pulling well." Instead of resorting to a makeshift brake of this kind the car may be securely jacked up, the high gear thrown in and the hub or differential brakes applied sufficiently to slow the motor to a moderate speed. This practice is only recommended for very short trials, however.

One thing which should be remembered: That it is more essential to have a carburetor so adjusted as to enable its motor to pull hard on low speeds and under severe loads than to race madly when light.

About the Exterior Finish of Automobiles.

By Dr. D. A. Stapler.

I feel quite confident that among the new 1905 models I will find a four-cylinder, medium-sized and medium-priced automobile with ample power and mechanically so perfect as to make it useful for a physician. In fact, I came to this conclusion after the last show, when I saw how the most conservative American builders had abandoned their former efforts of making what they called a "typical American machine," and adopted instead the well-tried Continental methods. When I saw the horrid looking buggy form disappear; when the curved dash gave way to the "French" bonnet; when the motor in front arangement was adopted more generally and a few leading firms recognized the value of, and built four-cylinder engines, then I foresaw that all manufacturers would have to take this course, if they wanted to keep up with the leaders.

In considering to buy my third automobile, I decided to wait. The editorial in the HORSELESS AGE of Sept. 7 last showed me that I was not making a mistake, and I hope my forbearance will be rewarded by the improvements in the new acquisition. The new models will certainly be better built throughout; the parts will be easier to reach, to disconnect and put together than in the older models; ignition troubles, which are even now rare, will disappear almost entirely. Mechanical oilers will relieve the operator's mind and save the engine from destruction. Indicators and gauges will show at a glance where the trouble lies, should there be any. So it seems the ideal machine will be offered us in the near future. Of course, it will require care and attention, but will not cause excessive repair bills. I shall certainly not ask the dealer how fast the machine will travel, but shall ask him how slow it can move on the high gear. The ample power will insure me against getting stuck on steep grades or on bad roads. In one word, the new cars will be as practical as can be expected of a vehicle for the physician, to supplant the horse.

But I am also sure that no progress will have been made toward practicability in regard to exterior finish. It is difficult to leave the old and adopt new ideas or principles at once. Did it not take two lifetimes to change the old stage coach on rails into the modern Pullman car, which is still open for improvement? It is true, the progress of the automobile has been surprisingly fast, machinery and body having every year undergone such radical changes that an automobile of six years ago looks to-day pitiful.

It seems to me that the carriage character of the automobile should be abolished altogether. The automobile should be no longer the hybrid of a machine and carriage, but be made a true machine—on wheels.

To accomplish this, the exterior finish will have to change. Because a fine carriage is painted and beautifully varnished there is no reason why an automobile should be finished the same way. Because the large wheels of the carriage, to be light, have spokes, it does not necessarily follow that this is the best and most practical construction for the small wheels of an automobile.

Paint is used to protect the wood and metal from moisture and its destructive effects. The varnish, on the other hand, protects the paint by rendering it more resistant. A fine carriage is impossible without paint and glistening varnish—both are essential to its life and to please the eye. But let us compare the use of a carriage with that of an automobile. The carriage is a relatively slow moving vehicle with narrow wheel rims or tires, and owing to its slow speed and narow tires it stirs up but very little dust. The fast movement and the large tires of an automobile, on the other hand, are responsible for a great deal of dust being stirred up. After a short pleasure drive the automobile is usually covered with dust, whereas a carriage after being driven the same time over the same road would show hardly any dust. On a trip through the country so much sand and gravel are thrown against the body of an automobile that the varnish is soon full of very fine scratches, while if the roads have been watered, or on rainy days, the automobile is literally covered with mud. We see, therefore, that an automobile accumulates dirt on its surface more quickly and in greater quantity than a carriage, and we must consequently provide means to enable us to clean an automobile quicker and easier than a carriage. At present we have no such means at our command, and the result is that an automobile after three months' steady use looks like an old, worn-out vehicle. If an automobile is not washed by the owner or under his supervision, but in the garage, its appearance will suffer even more rapidly.

Every one who attempts to clean his muddy automobile will find it a very hard job. The usual method is to turn on the hose and use a good-sized sponge, with which the mud can be removed fairly well in a few minutes. But afterwards the water has to be sponged off, or the varnish will crack and the paint blister. After having done this carefully, and the body has become dry, you will find to your great disgust that it is far from being clean, because you did not rub the paint with a chamois skin, which is a very tedious operation. In order to get a shiny surface with less trouble, the garage men resort to all sorts of expedients, such as the use of oil, vaseline, kerosene, etc. A varnished surface thus treated will only gather dust very much quicker when the car is again put on the road, and the varnish suffers enormously. No wonder that such automobiles look dull after a very short trip!

If the cleaning of the body is a task, the cleaning of the wheels forms a chapter by itself. A friend of mine, when I was complaining of this state of affairs, remarked that an owner of an automobile is supposed to have somebody to clean his machine. The old story that the owner of an automobile must be a "millionaire"! But no rich man who has ten servants will ever dream of having bread made at home or use oil lamps, etc., because his servants can do the work. Everybody tries rather to adopt labor saving machines and improvements, no matter whose work is made easier by their use.

Some French manufacturers and owners have tried to overcome the difficulties mentioned, the former by leaving the body without paint, putting only varnish on, giving a so-called natural wood finish; the latter by having their automobiles painted in an indefinite dust color. Both methods are improvements, but I think we should sacrifice beauty to practicability and discard the customary painting of the body altogether.

The body should be made of aluminum and left with its natural surface exposed. Of course, the paint covers many faults in construction or assembling of the body, but the body work can be done more accurately, so that it will not need to be hidden by paint and putty. Dust on aluminum is very readily wiped off, the hose and sponge remove all mud, and there is no necessity for using the chamois skin.

The wheels should be disk wheels. Two pressed steel shells, slightly dished, each forming one-half of the rim, clamped together by four bolts, would not only make a strong wheel, but would also solve the question of how to detach or put on a tire quickly, easily and without exertion. But it seems that there are no such wheels on the market, and I should be compelled to cover the spoked wheels by two dished aluminum disks, clamped by the new Dunlop rim.

The parts which cannot be made of aluminum should be painted with aluminum paint. This paint protects the parts from rust, and has the advantages over the common carriage paint that it is cheap, that it can be applied quickly by the owner or chauffeur, that it dries quickly, and can be applied in spots only or on parts which need a protective cover more frequently. An automobile thus treated will look better after two years of use than one painted in the customary manner after as many months.

It will certainly take some time until the public will be converted to the idea that an automobile need not be painted like a carriage, and that these two vehicles have nothing in common.

Dealers in the past, no doubt, have made sales telling of the number of coats of paint on their cars, or calling attention to the fascinating appearance, the color, the seducing varnish of the shining brass, but the practical man pays little attention to these "catch devices." He knows that paint and varnish are only skin deep and not worth paying extra for.

Case Hardening.

In a process recently patented by Carlo Larargese, of Rome, Italy, a mixture of charcoal and lampblack is used which enables case-hardening to be done in much less time than with charcoal or other mixtures. It has been found that the best results are obtained when the mixture is produced by carbonizing the bark of wild pine or other resinous woods in a closed crucible or retort provided with suitable means for the escape of the volatile glass, but so as to retain in the retort the lampblack produced by the resins contained in the bark or added to the wood. In place of the bark of wild pine it is possible to use common wood with the addition of a suitable quantity of resin, mineral, or vegetable oils, fat, or other hydrocarbons.—English Mechanic.

New Vehicles and Parts

The Adams-Farwell Motor Car.

The Adams Co., of Dubuque, Ia., have been experimenting quietly with automobiles since 1898, and are now placing on the market a car which abounds in original features in both the propelling mechanism and the arrangement of the body and the controlling means. It is significant that although the motor differs radically from present standard designs, the general type (triple, air-cooled, revolving cylinder) has been employed throughout from the first, and has, therefore, six years of service to attest its practicability. The Adams Co. have sent us illustrations of all the cars they have built in succession, and a brief review of the development of their car may be acceptable to the reader.

The first motor had three 4x4 inch cylinders and was placed on a fore-carriage under an express wagon. This model had iron tires and was rather primitive in general appearance. It was operated for several months and proved the practicability of the air-cooling system, of the ignition and several other features. The next model built was fitted with a 5x4 inch engine of the same type. Its running gear was of the familiar steam carriage pattern. While the engine is said to have proven entirely satisfactory, the running gear proved too light for the high power and the rough and hilly roads in the vicinity of Dubuque.

The third model built had a 5x4½ inch triple cylinder engine, which is exactly the same as that now used. The features of this car, which has been operated continually since the fall of 1901, are a reachless running gear, wood artillery wheels, and a tasteful runabout body with large folding seat front compartment. In the fall of 1903 this car was fitted with a canopy top, side curtains and glass front, and it was thus used during the following winter. The canopy top was not entirely satisfactory, however, and for this reason the car was later fitted with a closed body with side doors and large plate-glass front in a substantial frame, sliding in rigid pillars which support a solid roof. The car is a convertible brougham, having a collapsible front seat and being arranged so it can be driven from inside the cab or from the front. The car now to be placed upon the market is known as Model 5, the intervening Model 4 being a car closely resembling Model 3, and sold to a party in Dubuque.

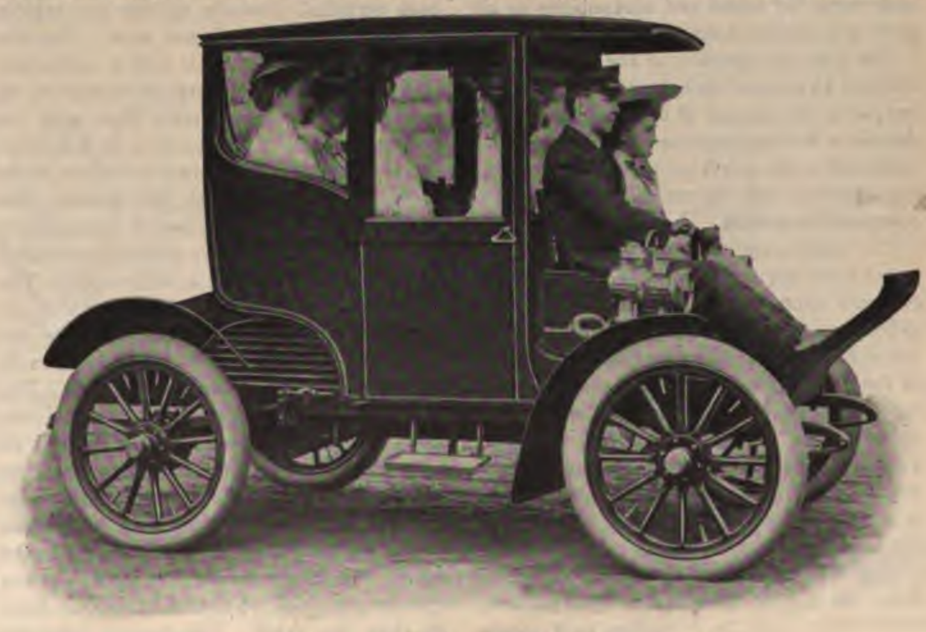
THE MOTOR.

The Adams-Farwell revolving cylinder, air-cooled gasoline motor is claimed to have distinctive advantages because of its compactness, its perfect balance, light weight, wide range of speed and power, and practical air cooling under all conditions. It reverses the ordinary practice in that the engine cylinders revolve and the crank shaft is stationary, instead of the crank shaft revolving and the cylinders being stationary. It is not what is usually termed a rotary engine. Three units, each being a complete cylinder with cylinder head and one-third of a central crank case cast in one piece, are bolted together and bolted to a top and bottom cast steel flange which has bronze bushings forming bearings around the vertical stationary crank shaft. This forms the revolving unit, and is, of course, balanced perfectly. This revolving unit in a 20-h. p. engine with 5" bore and 4½" stroke, weighs 190 lbs. and forms the flywheel.

In each cylinder is a cast piston having four rings. The three pistons are connected to a single crank wrist pin of very large proportions, by bronze pitmans. The pitmans, with the pistons at their outer end, swing around the stationary wrist pin in practically perfect mechanical balance. The wrist pin being eccentric with the axis of the revolving cylinder unit, the pistons are caused to reciprocate back and forth in the cylinder at each revolution of the revolving unit, although the motion of the mass on the pistons does not change or stop and reverse at each dead center, as with the ordinary engine. It is, therefore, susceptible to a very perfect mechanical balance.

All engines exert a force or torque in two directions during the explosive or power stroke. A force or torque tends to turn the crank, and with it the flywheel, over in one direction, and an equal force or torque tends to turn the engine cylinders, casing, etc., in the opposite direction. The ordinary engine has the cylinders and case secured to a foundation, and they cannot turn, but the crank shaft is free to turn. The Adams-Farwell has the crank shaft secured so it cannot turn, but the cylinders are free to turn. The ordinary engines transmit their power from the crank shaft; the Adams-

ADAMS-FARWELL MOTOR BROUGHAM.



SHOWING SEATING CAPACITY.

VIEW OF ENGINE AND ACCESSORIES.

1, Inlet passage; 2, head plate of crank case; 3, inlet valve; 4, exhaust valve; 55, spark plugs; 6, insulated high-tension commutator terminal connected to plug by wire; 7, high-tension commutator; 8, circuit breaker; 10, conductor carrying high-tension current from coil to commutator; 11, conductor connecting coil and circuit breaker; 17, gasoline spraying chamber; 18, constant level compartment; 19, gasoline feed pipe; 23, gasoline adjusting valve; 32, oil reservoir filling cup; 34, oil pump; 35, cylinder oil tube; 36, crank oil tube.

Farwell transmits power by bevel gear from the revolving crank case. This is the difference technically, but the builders claim distinctive advantages for this motor where lack of vibration, light weight, simplicity, practical air cooling under all conditions, wide range of speed and accessibility to all parts is a desideratum.

The lack of vibration of the motor is attributed to the perfect balance of the revolving parts, the manner of revolving the cylinders in a horizontal plane around a vertical axis, and to the novel manner of controlling the speed of the motor by their variable compression system.

The light weight of the motor as compared with the three-cylinder motor of the ordinary type having the same power and cylinder sizes, is due to the elimination of many parts found necessary in the engines of the ordinary type: a single central crank case answers for the three cylinders. A single throw crank is employed, of about one-third the weight of the three-throw crank found in the other type of engines. A single valve operating cam opens both the inlet and exhaust valves. As the entire engine revolves, except the crank shaft and base, the engine is its own flywheel, and *being heavy (190 lbs.)* insures very steady *running.*

ARRANGEMENT OF EXHAUST.

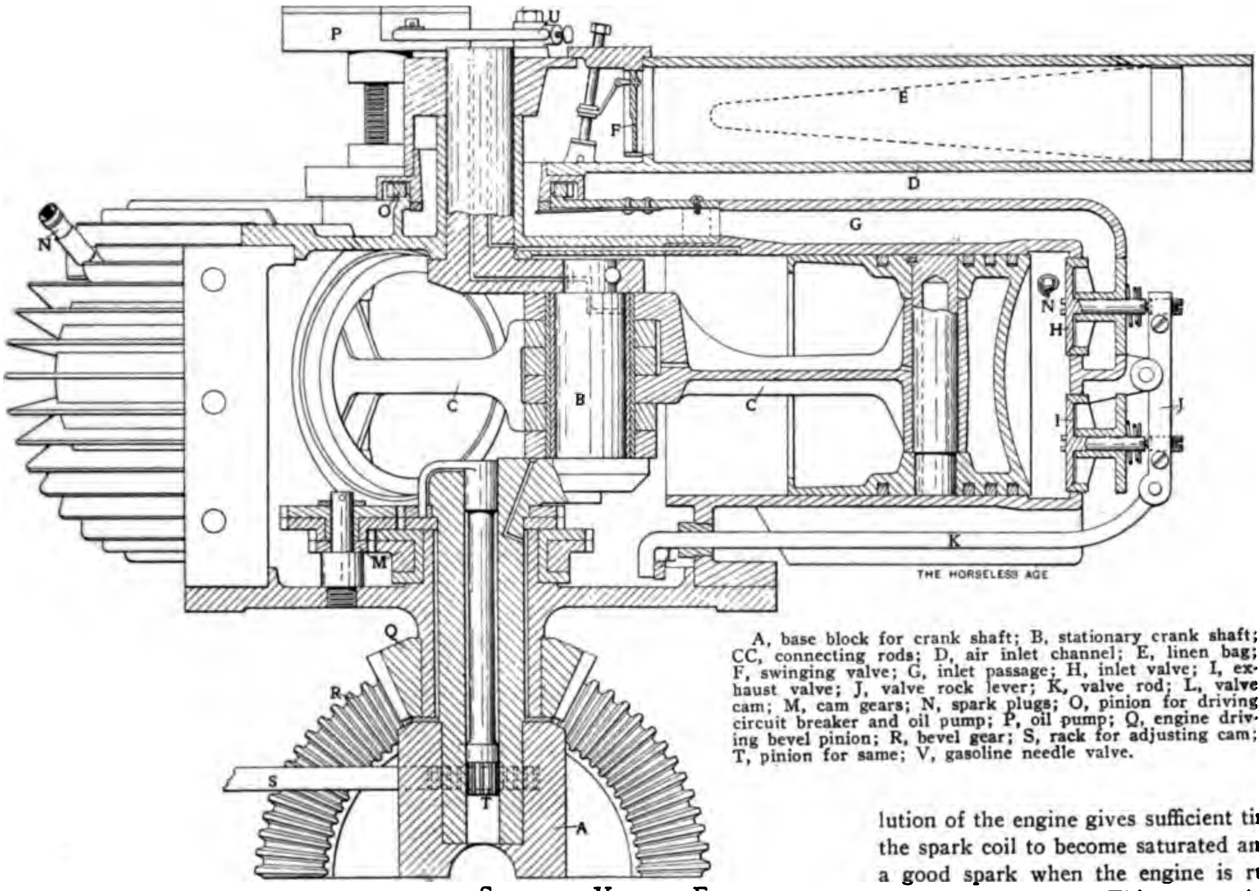
No muffler is employed. It is claimed that because of the velocity of the cylinders passing through the air, a muffler of the ordinary type may be entirely dispensed with. Auxiliary exhaust ports, which let out the high terminal pressure against the rapidly receding volume of air are used. The discharge acts upon the air like a skyrocket, and not like a gun. There is claimed to be less noise with this system than with the ordinary engine when working at full power, and the exhaust cannot be heard when the engine is working at part power. The auxilliary exhaust ports reduce the pressure to that of the atmosphere before the exhaust valve in the head of the cylinder opens. The gases that pass out of the exhaust valve are therefore comparatively cool, and the annoyance of pitted and warped exhaust valves is said to be entirely overcome. The duty required of the valve operating levers, cams and gears is very light, as there is no terminal pressure in the cylinders when the valve opens. The valves are closed by centrifugal force, which varies in proportion to the requirements. The higher the speed of the engine the greater the force, and the greater the need of a stiff spring or force to close the valve. The springs used are made of light piano wire, and are useful only to close the valves in starting the engine, where the centrifugal force at the slow starting speed might not be sufficient to overcome the resistance of cold lubricating oil on the valve stems. After the engine is slightly warmed, the spring might be entirely removed.

The natural cooling is facilitated by the cylinders revolving at a rapid rate, drawing in air at the center and expelling it with great rapidity at the periphery or ends of the cylinder. The cylinders are provided with integral longitudinal ribs, which provide a large radiating surface. The cylinders themselves act as a fan, in a way.

MOTOR CONTROL.

The speed of the motor is controlled entirely by a variable compression system. Means are provided to allow a part of the charge to escape back through the inlet valve, which is mechanically held open for a part of the compression stroke, that part of the charge so escaping being drawn in by another cylinder. There is no waste of gases. When the maximum power is required, the inlet valve is closed at the end of the suction stroke, and the full charge is compressed to about 95 lbs. per square inch. When minimum power is wanted, the inlet valve is not closed until the completion of the compression stroke; an exceedingly small part of the charge is retained and ignited at atmospheric pressure, giving a gentle expansion. A range of power and speed anywhere from maximum to minimum, or *vice versa*, can be had instantly or gradually, as desired. This system of control is claimed to be very economical, to be conducive to very smooth running, to obviate the necessity of heavy exhaust valve springs, to cause the engine to run much cooler and to keep the cylinder heads and spark plugs entirely free from sooty deposits.

The carburetor is claimed to be automatic at all speeds. Gasoline is pumped through the upper pipe 19 (Fig. —) into the constant level reservoir 18, which is a small cavity covered with a watch crystal, enabling the gasoline to be seen, and water (if present) detected. The surplus gasoline flows back into the pump well through the lower tube. An opening connecting the reservoir with the valve 23 is regulated by a needle valve. The air, after passing through a linen bag in the inlet passage, which prevents dust entering, raises the little swing valve and at the same time the gasoline valve 23, forming a vapor which enters the central chamber and thence passes out through the channel at the top of the cylinder and through the inlet valve 3. The sectional view of the engine shows this clearly. The proportion of air and gasoline is claimed to be always the same and the quality of the mixture is constant, but the quantity varies according to the power required and the position of the variable compression cam. The mixing valves are opened only after the sucking cylinder has drawn in that part of the charge which the compressing cylinder is blowing back by its inlet valve.

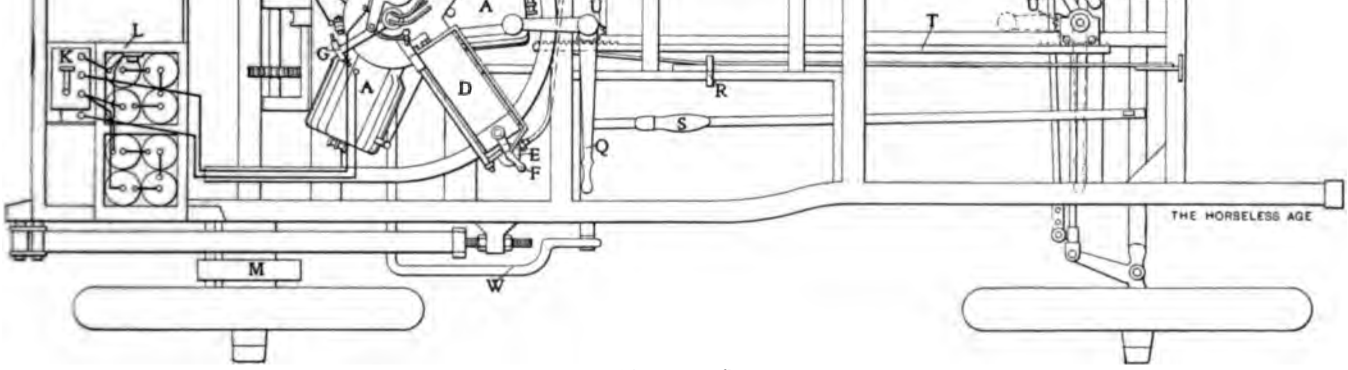


A, base block for crank shaft; B, stationary crank shaft; CC, connecting rods; D, air inlet channel; E, linen bag; F, swinging valve; G, inlet passage; H, inlet valve; I, exhaust valve; J, valve rock lever; K, valve rod; L, valve cam; M, cam gears; N, spark plugs; O, pinion for driving circuit breaker and oil pump; P, oil pump; Q, engine driving bevel pinion; R, bevel gear; S, rack for adjusting cam; T, pinion for same; V, gasoline needle valve.

SECTIONAL VIEW OF ENGINE.

AUTOMATIC SPARK REGULATION.

The spark is regulated by an automatic spark regulator which fires the charge at all speeds at a point to produce the greatest efficiency. This device employs a centrifugal governor which not only advances the spark when the speed of the engine increases, but also increases the length of the contact of the primary circuit. A contact of the primary circuit for 1-36th of a revolution of the engine gives sufficient time for the spark coil to become saturated and give a good spark when the engine is running 150 r. p. m. or less. This contact is automatically increased to about 1-12th of a revolution of the engine when running at 900 r. p. m. This is claimed to result in a great saving of battery current and contact breaker points, for without this variable contact it is necessary to make the contact



PLAN VIEW OF CHASSIS.

AAA, engine cylinders; B, automatic oil pump: C, oil tank; D, air suction channel; E, gasoline well and pump; F, pump lever; G, high-tension commutator; H, change gear; I, driving chain; J, differential gear; K, spark coil; L, sparking battery; MM, hub brake drums; N, tool box; O, gasoline pipe from tank to well; P, gasoline tank; Q, steering lever; R, emergency brake pedal; S, engine treadle; T, rack for operating steering gear; UU, gear sectors connected by rack; V, cam in steering gear.

of the primary circuit long enough for the highest speed, thereby using two or three times as much current when the engine is running slow.

Only one spark coil is used. The high-tension current is carried by wire 10 (Fig. 3) to the commutator 7, consisting of an insulated segment with a brass strip on the lower edge. On each cylinder there is a 6 is an adjustable brass cap which is adjusted to pass under the commutator strip 7 without quite touching. In operation, as the cylinder that is at the time compressing wire leading from an insulator 6 to the spark plug 5. On the top of the insulator approaches the position straight back (which is the dead center position), the insulator 6 is passing under the commutator, the contact breaker breaks the primary circuit, and a spark jumps the gap between the commutator 7 and the cap on the porcelain 6, and thence to the spark plug and into the cylinder.

When the motor is started, the spark is late and jumps the gap at the extreme right hand end of the commutator; a back kick is impossible. As the speed of the engine increases, the automatic spark regulator advances the spark and it jumps the gap further and further toward the left end of the commutator. The exact position of the spark can be seen while the motor is in motion. Two sets of batteries are provided, a spark coil and a double-throw switch which enables either set of batteries to be used separately or both together after they have become too far exhausted to run the engine separately. All the electrical wire is exposed to view and a loose connection can at once be located.

LUBRICATION SYSTEM.

The oiling of all parts of the motor proper is cared for by an automatic, positive feed oil pump. It consists of a circular barrel containing four cam-actuated plungers. The barrel is positively driven by a worm gear, and is claimed to positively deliver one drop of oil to each of the four tubes every 100 revolutions of the engine. Two of these tubes lead to a distributing channel in the upper end of the crank shaft and oil the top of each cylinder; one tube leads to the upper end of the wrist pin and from there to the lower crank shaft bearing; a surplus accumulating in the crank case lubricates the valve operating cams and gears. An opening on each side of each cylinder admits oil from the crank case to the cylinders, thus oiling each cylinder and piston at three equi-distant points. The fourth tube is an extra and is usually turned to deliver its oil back into the tank. The oil tank is located in the left end of the angular aluminum casting which forms a support to the upper end of the crank shaft. Being very close to the engine, it is kept warm in the winter time, and the tubes leading from the pump are very short and not liable to be broken.

ACCESSIBILITY.

Easy accessibility to all parts of the motor, transmission and running gear mechanism is claimed for this car. The entire motor mechanism is under and back of the rear seat. The gasoline tank and a convenient receptacle for carrying tire pump, extra inner tubes, jack, etc., are under the floor between the seats. There is a space under the front seat (some 5 cubic feet) for storing away touring baggage, picnic baskets, etc.

All of the parts shown are accessible, without removing the body. A small trapdoor under the front seat gives access to the forward steering-gear mechanism; the floor between the seats is easily removable, as well as the rear seat. For ordinary attention and adjustment, however, the raising of the sloping top of the body is all that is necessary. Every part of the motor proper that will ordinarily ever require examination or adjustment is exposed to view and readily accessible from this position; also every tool required in these adjustments, each in a separate pocket. A few extras, such as spark plugs, valves, bolts, nuts, springs, etc., an extra supply of lubricating oil, an oil can, some waste and a pair of asbestos tanned gloves will find room here.

With no compression, the cylinders may be easily turned around, bringing any one in convenient position for removing spark plug or valve. All valves are duplicate. A cage, forming the valve seat and guide for the valve stem, is screwed into the head of the cylinders. Should a valve leak, it can be replaced by another in a few minutes on the road, and the grinding-in process done at leisure.

No gaskets or packed joints are used on the engine, and the brass gasoline pipe, some 4 feet in all, is the only pipe about the engine. By taking out three bolts on each side, two on the top and two in the bottom flange, any cylinder may be removed for examination of piston, pitman or interior of crank case without disturbing any other part of the engine. By removing the two cap boxes on the transmission shaft, the entire mechanism can be removed.

The base of the motor to which the crank shaft is keyed is a spider-shaped bronze casting, which is secured to the châssis of the car by five studs. Every part of the motor and transmission is secured to this bronze casting, forming an integral, rigid power unit that may be removed and operated independently of any other part of the car.

The complete power plant, including all parts of the motor, transmission, oil tank and pump, carburetor, clutch operating cams, etc., forming an integral power unit secured to the bronze supporting spider, weighs 387 lbs. Of this, 157 lbs. is made up by the transmission which would not be needed if the motor was used for other purposes than that of automobile propulsion. Of the 230 lbs., the weight of the motor proper, 190 lbs., is the cylinders, etc., forming the revolving unit or flywheel. All motor and transmission bearings are bronze with steel shafts, and the bearings are renewable.

The gasoline tank is made of heavy copper, riveted and soldered. It has a partition in the center with a communicating stop cock. With stop cock open, both halves of the tank will be filled; if then shut off, warning will be given when half of the gasoline has been used and there is just enough gasoline left to get home on. A union stop cock is in either end; the tank is slung under the center of the car by two heavy straps and may be easily reversed should an accident cause one end to leak, or it may be removed if it is desired to store a car in a building where gasoline would not be allowed; it obviates the necessity of looking for clean cans in which to draw off gasoline.

CONTROL.

The Adams-Farwell car may be operated from the rear seat of the inclosed compartment, or from the folding front seat. This system is patented, and is considered a valuable feature in a car of this character, as the operator should at all times have an unobstructed view of the road. The change of the controlling column and pedal from one seat to the other is said to be less than a minute's time.

In the controlling of the car there is employed a steering lever, one clutch lever (which also locks the brake), one treadle to vary the speed of the engine, and a pedal to apply the hub brake—four devices in all. The clutch lever when in position straight back, locks the hub brake; a movement forward to the right releases the brake and engages the low forward gear; further movement releases the low and engages the high gear, while a backward movement first releases the high and engages the low gear, then releases the low and engages the backing gear, which may also be used as a brake. There is a position between the brake and backing where the spark is shut off and the engine stopped.

The speed of the motor is controlled entirely by a foot treadle, which controls the variable compression system. Spark and carburetor are governed automatically. The position of the foot is natural and will not cause fatigue. A pressure on the toe increases the speed of the engine, a pressure on the heel decreases the speed.

BRAKE.

An internal, expanding, double-acting brake on the rear hub is engaged by pushing a pedal forward. If this brake is engaged when the clutch lever is straight back, the brake will be locked. In this position the car will be securely held on a hill or elsewhere. As soon as the clutch lever is moved to engage either the backing or low forward gear, the brake is automatically released. No harm will therefore result if the oper-

VARIABLE STRENGTH SPRING.

hould forget to release the brake be-
ngaging the clutch.

STEERING GEAR.

steering gear adopted is claimed to ne the quick action of lever steering he safety of wheel steering. A cam nent is interposed between the steer-uckle and the hand lever, that is prac-irreversible, and relieves the hand of caused by the wheels striking an ob-ion. The control column to which the ng lever is hinged forms a rigid hold e left hand, giving the operator great ge, and at the same time the left hand position to instantly release the clutch ange gear, while with the right hand k turn may be made. The controlling and pedals do not interfere with en-or exit from either door or side.

SPRING SUSPENSION.

is impossible to construct a car with rdinary springs and have it ride equal-nfortably and safely with a passenger of 150 lbs. and with a load of 900 lbs. e springs are strong enough for the load, they are too stiff for the light consequently uncomfortable riding.

e Adams-Farwell car is therefore ped with patent variable strength gs. These consist of springs with an liary leaf and means for clamping this to the main spring. When more than occupy the compartment, the rear aux-y springs are clamped to the main gs. When the front seat is occupied ront spring is clamped. The operation osening or clamping these auxilliary gs is said to require but a moment's Both front and rear springs being ame length and width, 40in. x 2in., one spring carried on a tour would replace spring should one be broken by acci-

RUNNING GEAR.

e car has an angle steel frame, which pported on semi-elliptic springs 40in. in h and 2in. in width, the front springs ng six leaves and the rear springs seven s. The front axle is a 1⅜-in. square, steel axle, and the rear axle a 2-in. y-walled tube. The axle bearings are e Timken roller type. The rear axle live axle, carrying a spur gear differen-just inside the left hand spring. It is en through a 1½in. x ⅝in. detachable roller chain. The wheels are of the wood artillery type, 34in. in diameter and shod with 4in. double-tube tires. The car has a wheel base of 84in. and a tread of 56½in. The body is of the brougham type with two seats inside and a folding seat in front outside. The passenger capacity is seven—three on the main seat, two on the intermediate seat inside and two on the front seat outside. The car is finished in black with gold stripe. It can be operated either from the front seat or from inside the closed body.

Attention is called to the secure manner of fastening the body to the châssis, six half-inch bolts being used, passing through metal-bushed holes in the body so as to avoid shaking loose. The châssis can be operated with the body removed, and a temporary seat may be provided if it is desired to run the car in a "stripped" condition in contests. The under part of the car is entirely free from delicate mechanism which would be injured by running over brush, weeds, etc. The clearance under the center of the car is 14in.; the differential and chain being on one side, come over the path made by horses and are 11½in. from the ground.

All the novel features, such as revolving the cylinders around a vertical, stationary crank shaft, system of muffling, variable compression control, automatic spark regulator, control from front and rear seat, variable strength springs, carburetter, oiling system, etc., are the subjects of patents granted and pending in this and foreign countries.

Brennan Four Cylinder Engine.

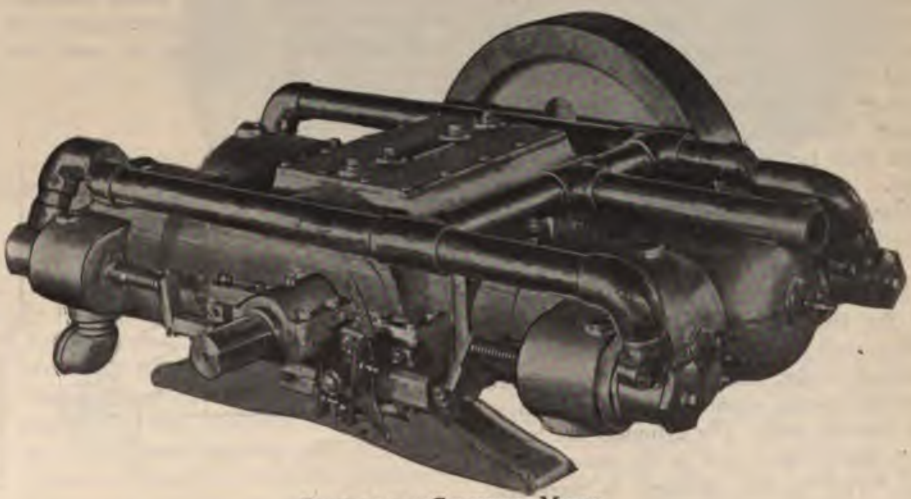
The Brennan Motor Car Co., of Syracuse, N. Y., have recently added to their line of gasoline motors a four-cylinder horizontal opposed type which is made in three sizes, as follows: A 28-h. p. motor of 4¾ inches bore by 5 inches stroke, weighing 400 lbs. and running at 800 r. p. m. normal speed; a 32-h. p. motor of 5 inches bore and stroke, weighing 425 lbs. and running at 800 r. p. m. normal speed, and a 40-h. p. motor of 5½ inches bore and 6 inches stroke, weighing 550 lbs. and running at 750 r. p. m. normal speed.

The crank case has a center partition or rib for carrying the center bearing and to insure an equal division of the oil. There are large passages or openings in the center wall of the case for equalizing the air pressure in the case. Each pair of cylinders have their cranks at 180°, so that when one set of pistons are on their inward stroke the other set are on their outward stroke, thus avoiding alternate compression and expansion in the crank case.

The crank shafts are made from a solid billet of forged steel of 35 to 40 point carbon, with bearings of liberal size. On the 28 and 30-h. p. motor the main bearings are 2 inches in diameter and the wrists 1¾ inches in diameter by 2 inches in length. On the 40-h. p. motor the wrists are 2 inches in diameter and 2½ inches in length, while the main bearings are 2¼ inches in diameter.

The crank case is cut with a substantial base for mounting, and an extra large handhole plate is provided on top of the case for inspection, adjusting, etc. All bearings have provisions for adjustment and lubrication, and are lined with anti-friction bronze that is claimed not to cut.

The four cylinders are supplied with gas from one carburetor, which is said to be automatic and to give the proper mixture of gas and air for all speeds and position of the throttle. The air valve and the valve controlling the gasoline supply are regulated automatically.



BRENNAN 4-CYLINDER MOTOR.

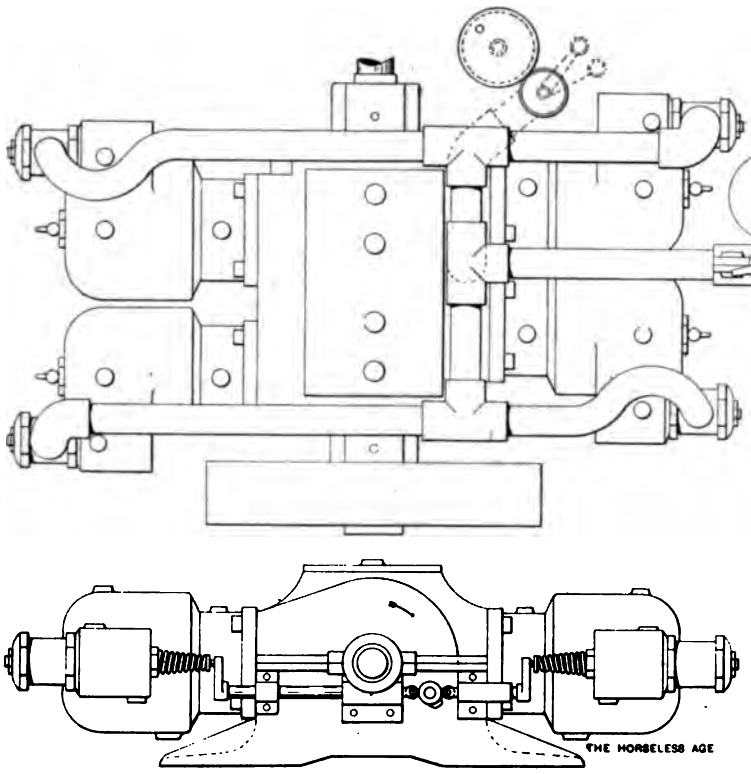


DIAGRAM OF BRENNAN 4-CYLINDER ENGINE.

The ignition timer is fitted on a stationary hub of the secondary shaft, and has sufficient tension to stay in whatever position it is put, with ample travel for early and late ignition. The contact cam is fitted with a hardened roller on a hardened shaft, so as to avoid wear on the commutator brush.

The connecting rods are made of steel, with interchangeable bronze bearings. On the wrist or crank pin end they are fitted with a hexagon castellated nut and cotter key, so that adjustment can be made to one-sixth of a turn. On the pitman end there is a binding screw with a split bush for taking up wear.

The gears for driving the secondary shaft are enclosed in the crank case, which keeps them well lubricated and protects them from dust and dirt. The cams for operating the exhaust valves are made from drop forgings and hardened, and operate against a hardened roller which is carried in the push rod giving the movement to the exhaust valve. The exhaust valve has one-quarter inch lead for opening, and closes on the center. The cam is secured to the secondary shaft by a key which runs the full length of the hub of the cam, and is secured by a lock nut.

Special attention is called to the finishing of the pistons, cylinders and rings. The pistons and rings, after being machined, are ground to size, due allowance being made for the unequal expansion of the piston at its opposite ends. The cylinders are bored in a special lathe, and at the same setting the flange on the cylinders is machined. The cylinder bore is finished with a floating reamer, and the cylinders are then ground by a grinder which forms a part of the special lathe for cylinder boring. The above method is found to produce round and parallel cylinders of uniform size. The rings are ground after they have been cut. This four-cylinder motor is especially intended for high powered cars and motor launches.

The New Renault Ignition.

The new 1905 model Renault touring cars, one of the first of which to arrive in this country we had an opportunity to inspect at Smith & Mabley's last week, are fitted with high-tension magneto ignition, which is an innovation for this firm. The system is rather complicated, but the apparatus is well made and differs considerably from any ignition arrangement we have ever seen. In starting the motor, the current is supplied by a dry battery of four cells, located in a polished hardwood box on the dashboard. The cells are of the square or prismatic type and occupy the same box with a trembler coil to which they are connected. At the side of the box is a small switch by which the batteries can be connected to and disconnected from the coil. From the bottom of the coil lead three wires, one of which is grounded nearby, at one of the dashboard braces. The other two pass under the dashboard and radiator, and through cleats secured to the engine apron, to a hard rubber switchboard secured to the forward end of the magneto. One is a primary lead and the other a secondary or high-tension.

The magneto is mounted on a forward extension of the engine base and is readily accessible when the bonnet is lifted, the more so as the radiator is located back of the bonnet. It is driven from the engine cam shaft through spiral gears without change of speed. The gears are completely inclosed and run in oil. The magneto itself is provided with self-oiling bearings at both ends.

We may here state that we cannot describe the apparatus in complete detail, because most of the parts are inclosed and hidden from view, and it was impossible to trace the connections without taking the whole apparatus apart, which, in view of its complication and the fact that none of the men at the garage understood it, was not deemed advisable. It is evident, however, that the magneto produces the jump spark direct, without coil, the same as the Bosch high-tension magneto. Besides, all of the outside connections can be traced, and a description of this part of the device will prove of interest, we believe.

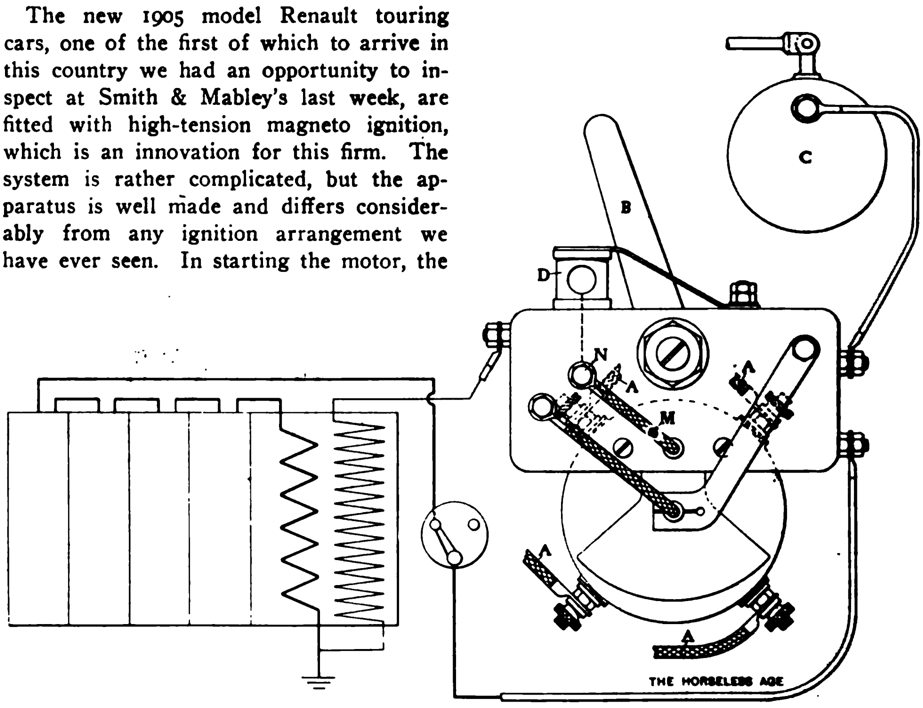


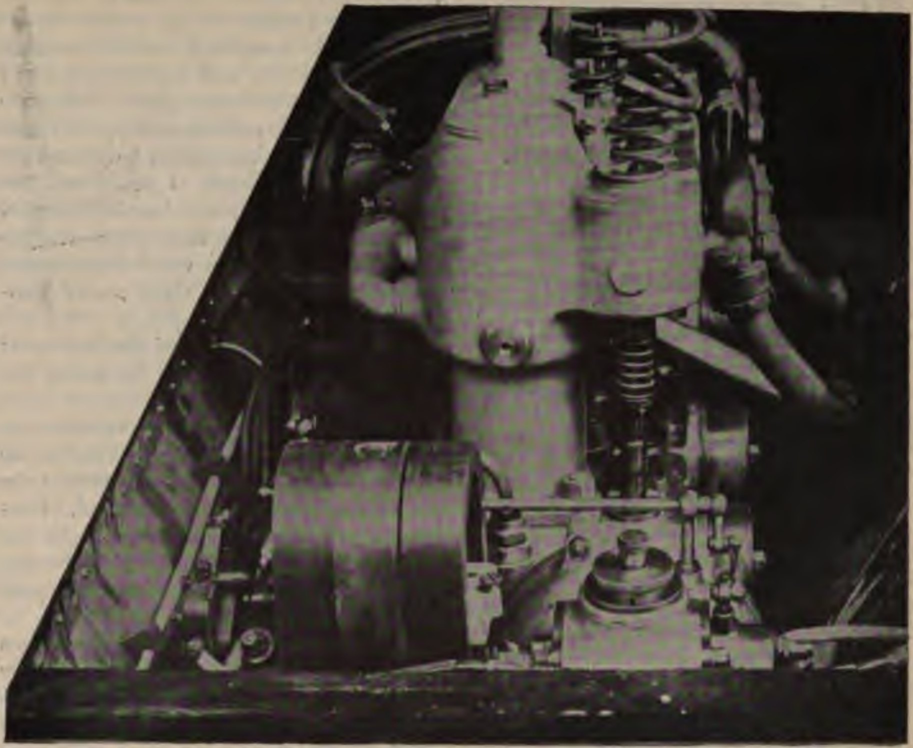
DIAGRAM OF CONNECTIONS.

The primary circuit breaker is mounted on the magneto shaft back of the driving gear. It is entirely inclosed, and the casing, from the end of which projects the solitary insulated binding post, is connected by means of shafts, links and levers to a small lever underneath the steering wheel, to allow of its being rocked around its center, to vary the time of ignition. From the binding post on the circuit breaker case leads a rubber-covered wire to the hard rubber switchboard already referred to. Back of this hard-ruber board is pivoted a double-armed red-fibre lever with an upwardly extending brass handle, serving as a switch. By means of this switch the change from battery to magneto and *vice versa* is made. A secondary commutator, or distributor is located inside the armature casing at the forward end. The casing is there circular and provided with four insulated binding posts in its shell, at equal distances apart, from which connections are made to the four spark plugs. The secondary cables pass through fibre cleats clamped to the inlet pipe.

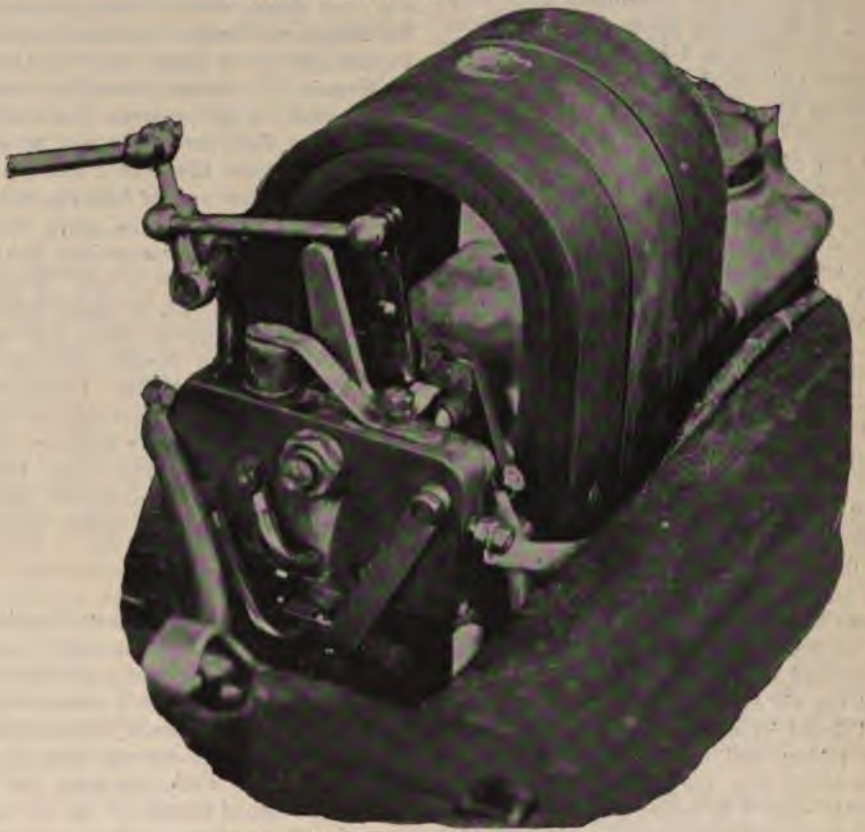
On top of the hard-rubber board is located a spark gap device, consisting of an upwardly extending needle surmounted by a brass cap held in position by a flat brass spring bearing down on it from above. The spark must jump from the uper end of the needle to the head or top of the cap, and can be seen through a small hole in the side wall of the cap which is screened off by a wire gauze. The high-tension current arives from inside the armature casing through the wire *M*, which is connected to the post *N*, to which is also connected the needle of the "spark gap." From the "spark gap" cap the curent is led through a brass strip and a bolt through an insulating bushing back into the armature case, to the high tension distributor. This spark gap operates both when the current is derived from the battery and when it is derived from the magneto. The spark coil on the dashboard, on the other hand, operates only when the battery supplies the current. Consequently, it is evident that when the battery is used the secondary of the spark coil is connected to the high tension circuit on the hard ruber board by means of the switch.

The magneto seems to work entirely without a spark coil; at least it is not connected to a coil outside the armature case, and the case is so small that it could not well contain a coil. The armature core must be of special construction so as to produce four impulses per revolution instead of only two. The lower arm of a double armed lever extends into the armature casing and the upper arm is conected to the timing lever. By means of this lever evidently a magnetic bridge or screen is shifted, so as to vary the time of the induced impulse.

While on the whole the system is quite complicated, and the switch arrangement reminds one strongly of a laboratory instrument, only the magneto and high tension distributor are working under ordinary conditions. One objection to the system is the double switching required. When it is desired to start the motor the change-over switch is first set for battery operation, which requires getting under the bonnet; the battery is then switched on and the motor started; then the change-over switch is set to connect the magneto (which requires again getting under the bonnet). Finally the battery is disconnected. The ignition cannot be switched off from the seat, but the engine can be stopped from the seat by cutting off the gas.



Front View of Engine and Magneio.



End View of Magneto.

TOURING ROUTES

A Thousand Mile Tour in New Jersey.

By Harry B. Haines.

Just about one year ago I had the pleasure of completing a 1,000 mile run through Southern Jersey and touching into Pennsylvania, with my single cylinder air-cooled car. After returning from the St. Louis tour I undertook and completed about the same trip in my double-cylinder air-cooled car of the same make, and a comparison of the incidents and expenses of both trips is rather interesting.

I left my home in Paterson bright and early on the morning of August 14th, to make the run to Asbury Park, N. J., via Newark, Elizabeth, Rahway, Metuchen, New Brunswick, Old Bridge, Matawan, Red Bank and Long Branch, a distance of ninety miles or more, over level macadam roads.

PEBBLE CAUSES PUNCTURE.

There were three passengers in the car besides myself, and everything went along swimmingly for the first fifteen miles, and then, while running along over the cobblestones in Newark, I felt the car swerving slightly and heard one of the rear wheels bumping along and making a great racket. I stopped the car after having driven it to one side of the road and got out, to find, as I expected, that one of the rear tires was flat. I at once jacked the machine up on that side, and, turning the wheel around, was unable to find a nail or anything else that seemed to have caused the puncture. Taking one side of the shoe off and removing the inner tube, the source of the trouble was found. In some manner or other a small pebble, rather sharp pointed, had fallen into the shoe and lay between it and the inner tube. The road friction had caused the stone to chafe the rubber until it had cut entirely through, of course letting all the air out of the tire. The shoe on this wheel was one that I had sent to the manufacturers to be re-covered, and it seems that the road friction had heated it up so that the new rubber that had been vulcanized on, separated from the canvas, and the air escaping from the inner tube, had found its way between the fabric and the rubber, and puffed out the latter. I was afraid that the shoe would give me trouble were I to insert a new inner tube and go on, and having a new casing on the touring top of the machine, I took it down and put it on the wheel in place of the old one. Getting the old tire apart and the new one together was an hour's job, during which time I was surrounded by a curious crowd that pressed around me to see what I was doing, making me uncomfortably hot, and hampering my movements. I was heartily glad when the new tire was pumped up and I was able to continue on my way.

I had no further mishap on the way to Asbury Park, completing the trip in good time. It took ten and a half gallons of gasoline to fill the tank after I had completed my day's running, and as I figure about ten miles to the gallon, I compute the day's run at 105 miles. I might say that the odometer on my car has been out of commission since last May, when it registered about 2,900 miles, which distance had been covered in about eight weeks' running.

A half gallon of oil filled the automatic oiler, and a small quantity of grease the various cups.

The following day when I went for the machine, I noted upon going around to the rear, that there was a nail driven into the left rear tire, clean up to its head. I secured a pair of plyers and pulled it out, expecting to hear the air rush out of the tire, but luckily the nail had not gone through the canvas and no damage was done.

For a week or more I made various runs around the country surrounding Asbury Park, taking in all the roads from the Atlantic Highlands to Lakewood, the latter trip being a favorite one, as was the run over the famous Rumsen road, making the trip from Asbury Park to Long Branch, to Sea Bright, to Pleasure Bay, back to Long Branch and up the Ocean drive to Asbury Park again. I averaged from fifty to seventy-five miles a day for seven days without mishap, and then the car started to skip spark, despite the fact that I had put in two complete new sets of batteries before leaving home. I re-set the spark points and went over the wire connections, and the engine worked better for a time. It acted rather strangely though, at times running finely and then skipping spark, and suddenly without being touched starting up again and running regularly. I could not understand what would cause this, and had the batteries tested with an ammeter, only to find that they were in good shape. Later, when on my trip to Philadelphia, which ended this tour, I learned rather forcibly the cause of this trouble.

THE FIRST TOW.

Up to the 22nd of last August I had been spared the ignominy of being towed in, always managing to crawl home with the machine under its own power in some way or other, but on the afternoon of that day while on the Ocean Drive coming from Long Branch to Asbury Park, I met my quietus and lost my proud record. I was running along the drive when a carriage suddenly pulled out of a side street and I was obliged to make a quick stop. On my car the gas and spark are on one lever, and I jammed this lever back with considerable force to shut off the power, at the same time disengaging the gears and applying the brakes. I avoided a collision, but when I wanted to go ahead I found that I could not budge the spark lever, and the engine was choked off, getting neither spark nor gas. I steered the car to the curb before its momentum was exhausted, and then got out to find the trouble. Upon turning the moter over, I was mystified to find that even with the compression relief open, the engine apparently compressed at every stroke of the piston, but refused to start. This was a puzzler, and I worked over the machine trying various things for over three hours, and then, as darkness was approaching, I sent my passengers back to the hotel on a trolley car and walked half a mile to the nearest auto station, where I secured a fellow with a high powered car who agreed to tow me in for $2. We rode back in his car and hitched a rope to mine, and then started for the auto station by the back streets.

We reached the station without mishap, and I found a mechanic there who assured me that he knew all about cars of the make of mine. I took his word for it and he set to work to find the trouble. I went back to the hotel, and after dinner returned to the station. I had been gone about four hours, and my mechanical friend was still working at the machine, but was no nearer the solution of the difficulty than when I left him. He was about to take the valves off when I arrived and stopped him. I then took a hand at the job myself, and went over the gasoline line, finding that the carburetor was all right and the gasoline flow was not blocked. In doing this work, I noted that the lever arm that operates the butterfly valve had in some manner been reversed. I turned this back to its proper position, and, turning over the motor, found it to work normally again, and it started at the first turn.

THROTTLE VALVE WAS DISARRANGED.

It seems that I had jammed the spark-lever back far enough to turn the lever arm around, and this had reversed the butterfly valve, keeping it closed at all times, so that no gasoline could be sucked into the cylinders, and consequently no charge compressed or exploded. It was a very simple thing, but just the same I had to pay the mechanic who knew it all, four hours' time at sixty cents an hour, amounting to $2.40, which with the $2 towing charge made $4.40 for this interesting bit of experience.

The car behaved nicely after this for a day or so, when the driving chain, which had been used since last March, began to act badly, climbing the sprocket and at times jumping off. The chain rumbled and rattled at times, making me think that there was something wrong with the gears, and finally became so annoying that I wired to the factory for a new chain. This was sent me with a bill for $14, after which this source of trouble disappeared, the car running quietly and smoothly with the new chain.

My next expense came when a rear shoe blew out, taking the inner tube with it, and I was obliged to crawl for five miles on the

rim and then invest in a new casing and inner tube, at an expense of $46.

GRIT IN OILER.

The automatic oiler next kicked up and caused me some trouble. It seems that a small quantity of waste and dirt had lodged under the check valves, and the oil could not be forced into the rear cylinder. Luckily, I discovered this before the cylinder had been cut, and taking the oiler apart, cleaned it thoroughly. The steel clip on the ratchet arm was also badly worn and was replaced with a new one. The factory had supplied this without charge, along with other parts of the oiler.

On August 31st I returned home, having but one delay on the road, caused by a patch burning off an inner tube in the rear tire and causing it to go down. This was remedied by inserting a new inner tube. I stopped at Old Bridge on the way up, buying six gallons of gasoline.

While down at the shore I had often carried as many as six and seven people in the car, and it had stood up nobly under the work. The load was, of course, a great strain on the tires.

The car was given a rest between Wednesday night and Saturday morning, when I started with three passengers to make a run to Tioga, Pa., a suburb of Philadelphia. The day before I started a friend of mine, who was out touring, telephoned to the shop in Paterson for a man to be sent to him, as his car, which was similar to my own, was in trouble. A mechanic went out and returned several hours later, having found that the spring in the igniter box which makes and breaks the spark, had cracked. I at once bought one of the springs in order to prepare for a similar emergency, and it was providential that I did.

While the car was in the shop at Paterson it was gone over generally and adjusted, a spring being put on the emergency brake to prevent it from creeping on while the car was in motion, a trouble that I had experienced. Altogether I spent $4 getting the car into shape, and then at ten o'clock Saturday morning started for the Quaker City. I experienced no trouble of any sort following the route from Paterson to Newark, Elizabeth, Rahway, New Brunswick, Dayton, Cranbury, Hightstown, Trenton (where I stopped for gasoline), Bordentown, Columbus, but when near Burlington things began to happen. The motor was running fine, when suddenly without even the warning of missing an explosion it stopped. I got out and cranked it a couple of times, but to no effect, and then it was up to me to find the trouble.

CONTACT SPRING BREAKS.

I quickly learned that the gasoline supply was all right, and then took out a spark plug to test the spark. There was nothing doing in the sparking line, and I opened the spark box. Everything looked all right there, and I had one of my passengers turn over the motor, as I wanted to see how the spark points were working. After a turn or two I found that they were not working the ignition spring was cracked. I pressed down on it with a screw driver to test it, and the spring fell in half. I thanked my lucky stars that I had brought an extra spring with me, or my trip would have ended, at least temporarily, then and there. It was over half an hour's work to get the old spring out, transfer the clips, spark points, etc., to the new one and get it in place. I finally completed this job, and, having secured the proper tension on the spring, essayed to set the spark points. The upper platinum point is held by a set nut, and unthinkingly I put a wrench on this nut to loosen it. I noticed that the screw seemed to work hard, and almost before I knew it I had twisted the head from it, having been turning the wrong way all the time. I mentally cussed a bit, but there was nothing to do but to allow the top point to remain stationary and get the adjustment on the lower one, which was no easy task, as in order to get at the set nuts on this point, it was necessary to release the tension from the ignition spring, and when the tension was put back the points were not the right distance apart.

After two hours' work, I finally got the points so that the motor would run after a fashion, and started again. The remainder of the trip to Camden was one long nightmare, the engine missing fire in a most discouraging fashion, with stops every now and then to readjust the points.

RUNNING ON ONE CYLINDER.

We hopped along, figuratively speaking, on one leg through Cooperstown and Beverly, and at Riverside the motor laid down again. After half an hour's hard work at the points, I managed to coax it to resume its activities on one cylinder, but try as I would, I could not get both cylinders to work. It was getting dark, so I pushed along as well as I could, being compelled to take every grade on the low gears, while on the hills I piled my passengers out, and with their united strength we managed to get over the crest of them and would then rush down the other side and get as far as we could before striking another hill.

It was eight o'clock at night when we finally reached Camden, tired out and disgruntled, and crossed to Philadelphia, the car still worrying along on one cyliner. I left my passengers at a hotel and then drove to the Philadelphia agency of my make of car and put up there. One of the factory experts happened to be on hand, and he went to work on my machine at once. After looking at the spark points he put in a new one on the bottom, declaring the platinum was gone from the old point, and also sold me a new bronze piece to hold the upper point with a new set nut, not waiting to drill the old one out. This cost $1.35. He finally got the engine so that it would run in good shape, and we then left it for the night. Early in the morning I was at the shop and had the car filled up with gasoline, eight gallons being necessary, which with five gallons I had bought at Trenton made thirteen gallons for the entire trip. After the grease cups and oiler had been filled, I got out the starting crank, not even removing my clean white cuffs so sure was I that the engine would start. I cranked it once, twice, three times, and then a dozen times, but there was no response, and then before long the perspiration was running down my face, and my cuffs, collar, tie and coat were off and I was at work trying to find the trouble. To make things worse, my people at the hotel, who were waiting to run out to Tioga, Pa., from where we were to go to a country estate of friends at Ambler, Pa., kept calling up every few minutes on the 'phone to know how long I would be.

COIL GOES WRONG.

Taking out the spark plugs and cleaning them, going over those everlasting spark points, and everything else I could do would not give me a spark. I hooked up the eight battery cells on one circuit, but with no better result, and at nine o'clock in the morning in despair sent for the expert, who was still in bed. He arrived at 9:30 and went to work, but had no better success than I had enjoyed in coaxing a spark. He then decided that the battery cells were weak and sent out for four new cells, which I paid $1 for. These were put in and connected up, but still there was no spark, and after some more monkeying, I finally decided that the coil must have gone bad. The expert would not believe that this was possible, nor could I convince him into thinking so, because, as he said, he had never heard of a coil going bad before. I insisted, however, upon him taking a coil out of a new machine that was in the place, which he reluctantly did, and when this was connected, the engine started off in good shape. I at once opened negotiations for the new coil and finally prevailed upon the manager to sell it to me, the price being $12. I have since sent the old coil to the manufacturers to have it repaired, and will carry it, in case of a similar emergency.

It was eleven o'clock when I finally got under way, and the run through Philadelphia and out to Ambler proved most enjoyable. On the return trip we drove through Philadelphia's beautiful park and around the city.

On Monday I started back for Paterson over the same route, carrying seven people as far as New Brunswick. My only mishap was a puncture, just outside of that place. Here three of my friends returned to Philadelphia by train, and the other three made the remainder of the run to Paterson with me.

EXPENSE ACCOUNT.

Upon my return home it was necessary to take up the adjustment on the cam shaft

gear, and also take up the connecting rods, which were slightly loose. This occasioned an expense of $6 for mechanic's time.

I figure the total expense of the trip at $140.40, accounted for as follows:

119½ gallons of gasoline, at 20c....	$23.90
Five gallons cylinder oil, grease, etc..	4.00
Twenty-one nights' storage, at $1....	21.00
Towing and mechanic's time, Asbury.	4.40
New batteries, 8 cells (at home)....	2.00
New batteries, 4 cells (at Philadelphia	1.00
New ignition spring................	.25
New coil	12.00
New driving chain..................	14.00
Spark point clip...................	1.35
Overhauling in Paterson............	4.00
New casing and inner tube..........	46.00
Tips and incidentals...............	6.50
Total	$140.40

In my trip in the single cylinder runabout last year, carrying four persons, I covered a little over 1,100 miles on almost the same roads with a total expense of $73.75, burning 79 gallons of gasoline at 20 cents a gallon. I could get about fifteen miles out of each gallon with the single cylinder car. The oil and grease expense with it was $3.25, a difference of only 75 cents under that of the big car. The repairs on the small car before and during the 1,000 mile trip amounted to $31.60. Altogether I was well satisfied with the performance of my machine, as I have been during the entire season, but I have had it most forcibly impressed upon my mind that he who would dance must pay the fiddler.

Word Coiners in the Automobile Field.

Speaking of automobiles, it is interesting to note the efforts of the word coiners to find an appropriate name for them. Up to date the language has been presented with the following substitutes waranted "just as good" as the original word: "Red devil," "teuf-teuf," "benzine buggy," "scoot-wagon," "whizz works," "cough cart," "hub bubble," "pike yacht," "dog-killer," "bubble buggy," "buzz cart," "devil wagon," "cash chasers," "rattle rigs" and "scare ships," with Mr. Dooley yet to hear from.—Ada, Minnesota. *Index*.

Vanderbilt Race War on Long Island.

On Long Island the war between the pro-racing and anti-racing factions has taken on a political aspect. The opponents of District Attorney Nieman, who is the Democratic candidate for County Judge, have made the race an issue in the campaign and the District Attorney is busy explaining that the Board of Supervisors gave permission for the race and that it was not within the power of his office to interfere.

The members of the board of supervisors estimate that nearly $250,000 was left in Nassau County by the visitors to the race, and have expressed a desire that the A. A. A. hold the next race over the same course.

BEGINNER'S PAGE

Four Cylinder Engines—II.

The structural part of a four-cylinder engine usually consists of a closed cast aluminum crank case in halves and cylinders bolted to same. The four cylinders are cast either separate or in two pairs—very rarely all in one piece. Casting them in pairs, twin-fashion, is the earliest practice and has the advantage that it makes a somewhat lighter and more compact engine, as the cylinder center lines of each pair can be closer together than when the cylinders are all separate, and consequently the crank case and the whole engine will be shorter. The separate cylinder method of construction offers the advantage that when a cylinder is found leaky after it has been bored only that particular cylinder need be discarded; also, in case a cylinder is damaged in use, either by overheating and cutting or by freezing of the cooling water, only that particular cylinder need be replaced with a new one, instead of a pair of cylinders. When four separate cylinders are used, they are often made interchangeable; that is, so that any one can be put in the place of any other. The crank cases are usually divided in a horizontal plane passing through the center of the crank shaft, all bearings, or at least the inner ones, being entirely supported by the upper half of the case, so that the lower half can be removed without disturbing the crank shaft. The upper half usually also carries the supporting arms or brackets.

The crank shaft of a four-cylinder engine, if properly constructed, has four throws or cranks, which are all located in the same plane. The shaft is supported in two outer bearings in the crank case, and in one or three intermediate bearings. The crank shaft with only one intermediate bearing (Fig. 3) is used more frequently with twin-cylinder construction, while the shaft with three intermediate bearings (Fig. 4) is used more particularly with the separate-cylinder construction. Either of these two types of cranks insures perfect balance

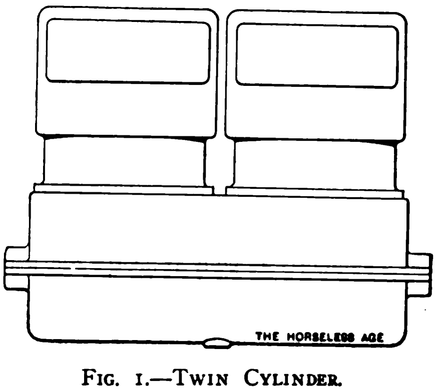


FIG. 1.—TWIN CYLINDER.

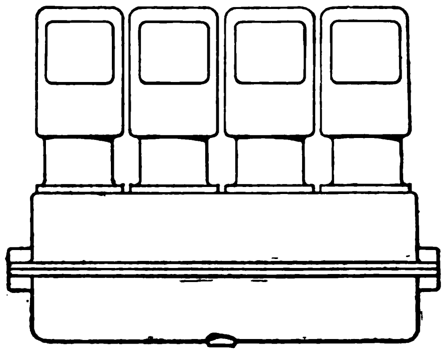
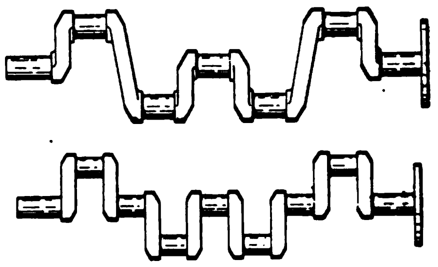


FIG. 2.—SEPARATE CYLINDERS.

of moving parts. In Figs. 5 and 6 are shown two other forms of crank shafts which can be and are used to some extent for four-cylinder engines, but which are faulty, because they do not give perfect balance of moving parts. In order to obtain this balance the two outer and the two inner pistons must each move in unison. The construction of Fig. 5 is particularly faulty, and would give rise to considerable vibration.

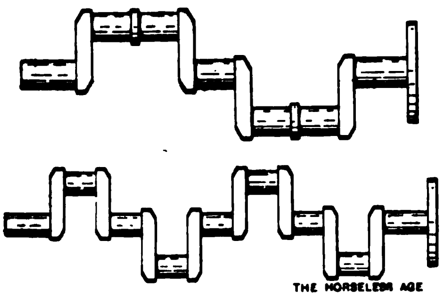
All four cylinders of a quadruple engine are supplied with combustible mixture from a single carburetor which is piped to the four cylinders. Care is usually taken to make the passages to the different inlet



FIGS. 3 AND 4—FOUR CYLINDER CRANK SHAFTS.

valves as nearly alike as possible. In vertical engines with inlet valves on one side of the cylinders, the carburetor is usually located on the opposite side of the engine, low down, and the inlet pipe led through between the two cylinder pairs, so that whatever differences there may be in the length of the different branches connecting to the valves, are small in comparison with the total length of the pipe. The exhaust from the different cylinders is also usually discharged through a single muffler through a cast iron exhaust pipe with four branches connecting to the separate exhaust ports. With twin cylinder construction frequently either the two exhaust passages or the two inlet passages join inside the cylinder casting, so that only one connection need be made for each pair of cylinders.

The most common form of high tension ignition for four-cylinder engines is by means of a quadruple coil—four separate coils put up in a single box. The method



FIGS. 5 AND 6.
FAULTY FOUR CYLINDER CRANK DESIGNS.

of connection for this system is illustrated in Fig. 7. One terminal of each of the secondary windings is connected to a binding post S on top of the coil case, and the other terminal of each of the secondary windings is connected to a common binding post S' on the end of the coil box. Similarly, one end of each of the primary windings is connected to a separate post P of a series of four, while the other end of each of the primary windings is connected to a common post P'. The connections can easily be traced. One terminal of the battery and the common terminal S' of all the secondary windings are grounded to the engine frame. The other battery terminal is connected through a switch D to the common terminal P' of the four primary windings. The four primary terminals P are each connected to a binding post on a commutator C, which is driven from the half-speed shaft of the engine, and the central rotating part of which is grounded to the engine frame (as indicated by a heavy dotted line). Each of the terminals S of the secondary winding is connected to one of the four-spark plugs.

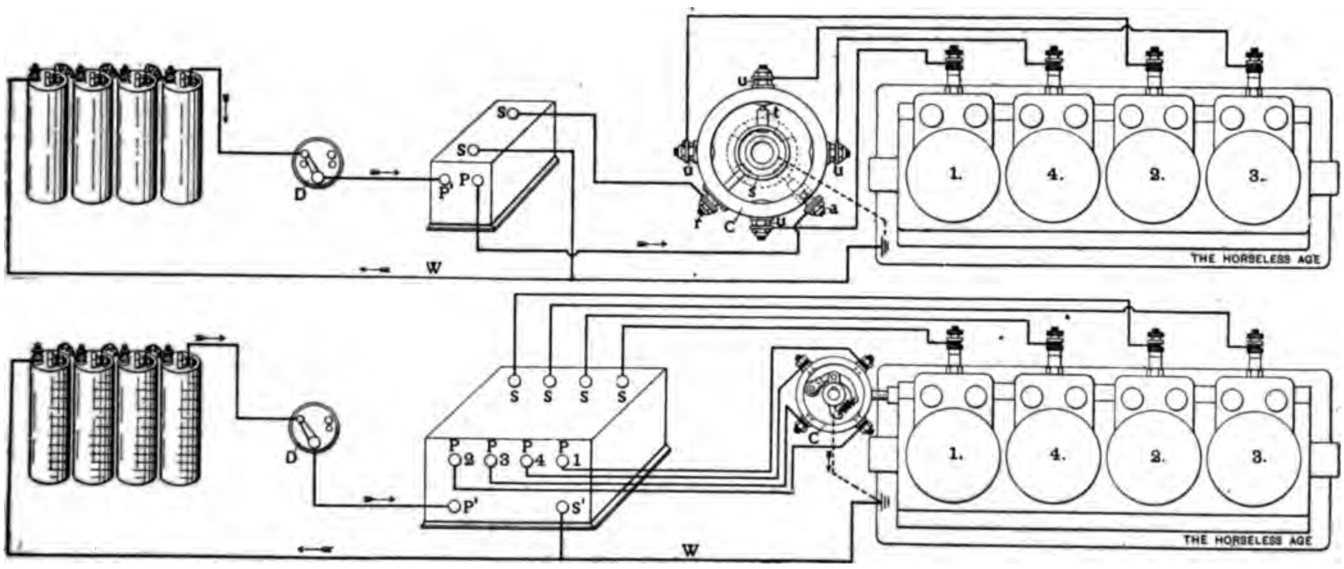
With the connection made as shown in the sketch, the battery current will flow from the right-hand battery terminal through the switch D to the binding post P' to which all four primary windings are connected. Whenever the rotating part of the commutator C makes connection with any of the four contact buttons, the battery current will flow through the particular primary coil which is connected to this contact button and will be led into the frame of the engine through the rotating part of the commutator. From the frame the current will return to the left-hand battery terminal through the ground wire W. The moment a current passes through any of the primary coils an electric impulse is induced in the corresponding secondary coil connected to one of the four spark plugs. A spark then jumps across the gap of that spark plug and the current returns to the coil in which it was produced through the ground wire W and the common terminal S'. It will thus be seen that the manner of securing ignition in the different cylinders in succession is to connect the battery successively to different spark coils, each of which has its secondary connected to one of the spark plugs.

The method of sparking four cylinders by means of only a single coil is illustrated in Fig. 8. When this method is employed both a primary circuit breaker or interrupter and a secondary or high-tension commutator are required. Frequently these two devices are combined in one, and such a combined circuit breaker and high-tension commutator is shown in the drawing (C). One terminal of the battery is again grounded to the engine frame, the same as one terminal of the secondary winding. The other terminal of the battery connects through the switch D to one primary P' of the coil, and the other primary P of the coil connects to the circuit breaker terminal *a*, which is grounded four times during each revolution of the circuit breaker. The path of the primary current can easily be traced. Every time a current is sent through the primary winding of the coil an impulse is induced in the secondary, and these impulses must be distributed to the spark plugs of the different cylinders in succession. This is accomplished by means of the commutator. The secondary current may be supposed to start from the upper terminal S, in which case it will enter the circuit breaker through the binding post *r*, which is secured to a pin bearing on a stationary ring *s* in metallic connection with the revolving brush *t*. This brush makes connection successively with each of the four contact buttons *u u u u*, each of which is connected with one of the four spark plugs. It will thus be seen that every time the primary circuit is completed through the circuit breaker the secondary circuit is placed in connection with one of the spark plugs, and that the cylinders are fired in regular order the same as with the system employed for separate coils.

At present the quadruple coil method is most widely employed, for the reason that a high-tension commutator is a somewhat delicate apparatus and liable to give trouble from leakage unless particularly well made and kept. The single-coil system, however, is superior to the other in point of low first cost.

Owing to the arrangement of the crank the four cylinders of an engine cannot be fired in the order of their location. Supposing that the cylinder at the left end is fired first, the successive cylinders from left to right must be fired either in the order indicated in the drawing, viz.: 1., 4., 2., 3., or they may be fired in this order: 1., 2., 4., 3.

In case one or more of the cylinders of a four-cylinder engine do not operate properly, to determine the cylinder or cylinders at fault, the different spark plugs are short-circuited in succession, either by means of a screwdriver or a special little testing device made for the purpose. If any particular cylinder is not developing any power, short-circuiting its spark plug will not make any difference in the speed of the engine; but if the spark plug of an operative cylinder is short-circuited, the engine will immediately slow down.



FIGS. 7 AND 8.

LEGISLATIVE AND LEGAL.

New York, N. Y.—Collector Stranahan has brought suit against the Brooklyn Ferry Co. for violation of Sections 44-72 of the Revised Statutes in carrying an automobile across the East River with its motor running. This is a test action to procure a court opinion in the matter of gasoline automobiles on ferryboats.

Terre Haute, Ind.—The Superintendent of Police has issued orders for the strict enforcement of the speed ordinance.

Lincoln, Neb.—An ordinance requiring registering and numbering has been presented to the City Council.

South Orange, N. J.—The township committee has passed an ordinance limiting the speed of automobiles to seven miles an hour in the thickly settled portions and twenty miles outside. Signs will indicate the limits of the seven-mile-an-hour section.

Warsaw, Ind.—The Invincible Detective Association will attempt to secure State legislation regulating the use of automobiles on the highways.

Bridgeport, Conn.—Fire Chief Mooney has discovered that all local automobile owners are violating the city ordinance which provides that no more than five gallons of gasoline may be kept on hand without the permission of the fire marshals. The ordinance further states that all gasoline must be stored underground and that there shall be no openings except below the level of the ground. It is likely that the ordinance will be amended soon to conform to the new order of things.

Washington, D. C.—The first annual report of the automobile board, which was filed recently, shows that 853 licenses have been granted since August 11, 1903. The board recommends greater restriction in the use of automobiles and suggests that the letters D. C. be added to the number cards so that there may be no confusion with numbers granted in the neighboring States.

Fond du Lac, Wis.—An ordinance has been passed which places the speed limit at eight miles an hour except on bridges, crosswalks and around corners, in which cases the limit is four miles. Numbering is also required.

Toronto, Ont.—According to an order in council issued recently automobiles and not owners are to be registered. Each machine must have an individual number. Manufacturers and dealers must have a tag for each machine in use, except those taken out to be tested or shown to customers, and with these they may not go further than five miles from home.

Bryn Mawr, Pa.—The Citizens' Association has passed a resolution calling for better police protection against automobile scorching.

Joliet, Ill.—Mayor Crolius is holding off from signing the recently passed automobile ordinance to learn the feeling of the motorists regarding it. A committee has been appointed by the automobile club to confer with the mayor on the subject.

Chicago, Ill.—The "endurance contest" between the Chicago Automobile Club and the city government seems to have been decided in favor of the latter. At a meeting on October 18 the club voted unanimously to give up the fight. On October 19 some two hundred members visited City Electrician Ellicott's office and applied for number tags. A number of club members have offered the use of their cars to the police department in their crusade against unnumbered machines. From this time on peaceful measures will be employed in an effort to secure an increase of the speed limit to eighteen miles an hour.

Lexington, Ky.—The Fayette County Fiscal Court has offered a reward of $20 for the arrest and conviction of anyone violating the law governing the running of automobiles.

Nashville, Tenn.—The City Council committee in charge of the automobile bill have decided to recommend to that body that a measure be adopted which will require the registering and numbering of automobiles by the city treasurer.

Another Injunction in Chicago.

On October 17 the Chicago Automobile Club, in the absence of President Farson, voted unanimously to abandon its fight against the city authorities and to comply with the law in all respects and to place numbers on their cars. Accordingly, on the following day some two hundred members headed by Secretary Gorham appeared at the office of City Electrician Ellicott for registration. Some of the members offered the use of their cars to the police for its crusade against scorchers and the owners of unnumbered cars. John Farson, president of the club, refused to surrender, and plans were made for his arrest. At eleven o'clock on the evening of October 21 he, Frank H. Mudd and T. J. Hyman, appeared with counsel at the house of Judge Hanecy and petitioned for an injunction restraining the city or park authorities from in any way interfering with them because of their failure to carry numbers on their cars. The petition was granted. It is said that the city will appeal from this ruling on the ground that the judge has exceeded his authority in granting an injunction at his home.

Rochester, N. Y.—Byron E. and Mrs. Anna V. Cornwall have brought suits against the New York Central Railroad to recover damages aggregating $25,426 for injuries to themselves and car which was wrecked in a grade-crossing accident.

Races at Grand Rapids.

Eleven events were run off at a race meet held at the West Michigan fair grounds, Grand Rapids, Mich., on October 18, under the sanction of the A. A. A. Oldfield, in the Peerless "Green Dragon," established new local track records for from one to five miles, placing the figures for the former at 56 3-5, and for the latter at 5:02 2-5.

The best race of the afternoon was that between Earl Kiser, driving a Pope-Toledo car, and Will Starring in a Peerless. They raced for five miles with no more than a car's length between them at any time, the lead being taken alternately. Starring won by six feet.

Paul Stamsen, riding a Mitchell motor cycle, made a new western record for five miles, covering the distance in 6:52.

A summary of the racing follows:

Runabout class, $800 or less: W. H. Leever (Cadillac), first; H. Bayer (Cadillac), second. Time, 6:51½.

Two-mile ladies' race: Mrs. George Hart (Franklin), first; Mrs. E. G. Squires (Ford), second. No time taken.

Five-mile open race: Will Starring (Peerless), first; William Russell (Michigan), second. Time, 8:09.

Five mile match: Will Starring (Peerless), first; Earl Kiser (Pope-Toledo), second. Time, 8:08.

Five-mile open for cars weighing from 881 to 1,432 pounds: J. R. Jackson (Franklin), first; C. E. Amsden (Franklin), second. No time taken.

Exhibition five miles: Barney Oldfield (Peerless). Time, 5:02 2-5.

Five-mile race for touring cars, Grand Rapids drivers: Mortimer Luce (Royal), first; W. S. Austin, second. Time, 8:46.

Exhibition three miles. Barney Oldfield (Peerless) "Green Dragon." Time, 2:52.

Two-mile exhibition: Carl Fisher (Peerless). Time, 2:08.

Three-mile race, Invitation Cadillac Cup: Claude Hamilton, first; W. H. Leaver, second.

Five-mile exhibition against time, on motor cycle: Paul Stamson (Mitchell). Time, 6:37.

Five-mile handicap: John Thoma (Rambler), first; W. E. Russell (Michigan), second. Time, 7:55 2-5.

Calendar of Automobile Dates and Events.

Oct. 14-22.—Leipzig Automobile Show.

Nov. 24.—Eagle Rock (N. J.) Hill Climbing Contest.

Dec. 9-25.—Paris Show.

Jan. 11-24—Importers' Automobile Salon, New York.

Jan. 14-21—New York Automobile Show.

Jan. 23-28—Record trials at Ormond, Fla.

COMMUNICATIONS

Carburetor Trouble?

Editor HORSELESS AGE:

Can you or some of your readers give me some information about using another carburetor than the one furnished on the Packard single cylinder 1902 model? I have tried all kinds of adjustments, but seem to get no relief. The engine may start off all right and run for ten miles or more, when it will appear to get too much air or too little gasoline, for it will "die." After priming, however, it may run again. Sometimes, after priming, it will seem to have too much gas, although I hold the float down the same each time. I have cleaned the tank, piping, carburetor, spray nozzle, and, in fact, have been all over it, but the trouble remains. Sometimes the engine may run for a day, and again it will quit in five miles. I would like to know if any of the carburetors now advertised would work better. Perhaps some of your readers may have had some experience along this line, and if they would let me know, I would be very thankful.

PACKARD.

[We do not see that there is any reason for assuming the trouble to be with the carburetor, but conclude from the symptoms that the battery is at fault. A dry battery will "run down" in use and fail to give a hot enough spark to ignite the charge; the operator will probably tinker around the motor for some time after it has stopped, and when he applies the crank it will start off again as though nothing was wrong, the battery having recuperated during the period of rest. We would suggest that you install a reserve battery on the car and wire it so that when the motor shows signs of stopping, you can quickly switch to the reserve battery.

We do not know of any carburetor trouble that reveals itself by such symptoms. If any of our readers familiar with this type of car do, we should be glad to hear from them.—ED.]

To Make Gasoline Cars Salable the Year Round.

Editor HORSELESS AGE:

Your remark on page 363, issue of October 12, *re* the fact that electric vehicles are salable all the year round, ought to contain a hint of value to the gasoline people. The public have need for carriages at all seasons, but when everybody is full of the new styles that may or may not be shown at the next exhibition, buyers naturally decide to wait. Almost every agent this year has felt the evil effects of the side entrance talk, and if the important shows had been held last month or this, buyers would at once be placing orders. As it is, they are writing us daily letters and telling us what they expect to do next spring, or, at least, after the New York show.

The electric people are not bothered by the racing fad. They know their abilities and their limitations. They stick to carriage designs and sell goods the year around. Carriage bodies are sufficiently well known to be of established shapes, and there is no need to change designs every year at great expense and great loss of business, when much better results could be secured by adopting a good thing and steadily improving it, by bettering the details and consistently refusing to change it. I wonder what makers and dealers will say to their customers next year after telling them of the superior features of the tonneau this year, for the rear entrance tonneau seems destined to give away to the ordinary surrey with doors and a different name. It would also seem that the Auto. Association might overcome many of these money and time wasting features of the business if they would simply do so. It is all nonsense to say that the public must be given what they want. The fact remains that the makers make the styles, and if they insist on making radical changes each year everybody suffers.

CHAS. E. DURYEA.

Equal Front and Rear Wheels.

Editor HORSELESS AGE:

Is there any mechanical advantage in using smaller wheels in front on an automobile? From the standpoint of economy and convenience the disadvantages seem certainly great. I had nearly decided to order a certain car, when I discovered the front wheels took a different size tire. That settled the matter at once. Tire troubles are bad enough without this complication. I have also found that tires that are a little too much worn to be reliable on the rear wheels will still do long service on the front wheels. At a chance meeting of half a dozen auto friends the other day, I mentioned the matter, and the opinion was unanimous that they wanted no cars with smaller tires in front. E. W. B.

[There may be a slight advantage in smaller wheels in front in that they allow the car to be turned in a shorter radius, but in most cases this advantage is very slight. The practice of using smaller front wheels was derived from carriage builders' practice, and was quite common in the early years of the automobile industry, but at present equal sized wheels are used almost exclusively.—ED.]

"A Change of Heart."

Editor HORSELESS AGE:

Under the above caption in the HORSELESS AGE of October 19, Dr. Charles A. Dennett tells why he changed from a steam to a gasoline automobile. He "had to watch the water indicator, the steam gauge, gasoline gauge and the water in the tank." I also have a small steamer, and an occasional drop of the hand to the water indicator, which is in easy reach, is all that is required. If you have such good company that you forget (although it becomes a habit after a time to touch the indicator), a fuse plug blows out, and you come back from dreamland and realize that a new plug is needed, but there is no damaged boiler, and the plug is replaced in a few minutes, or the valve can be closed and you can drive on, after pumping in some more water, to some place where you can be away from the crowd when putting in the plug.

On this same little steamer there is no steam gauge and no gasoline gauge to watch or bother about, and, by the way, no lubricator to open or close. With the tank full of gasoline, on which there is no air pressure, you can go about 130 miles on good roads, and with a tank full of water you are good for 30 or 40 miles. As to "tinkering" I have less of it than I had on the three gasoline cars that I have owned, and when anything does go wrong on the steamer I know it is a mechanical fault. With a gasoline machine it may be a fault of the machinery, or mixture of gasoline and air, or a fault of the electric current, or one of the several other things that are liable to happen to the gasoline car.

All the same I believe the gasoline is the coming car, and I am looking forward to the time when I may go back to a gasoline car. I do not like to spend the time necessary to get up steam. If it is only a short trip that one is to make, one can go and come back, sometimes, before steam can be gotten up. I do not like sitting over a steam pressure of about 400 pounds. One does not feel the same degree of security in leaving a steamer "under the shed" that he feels in leaving a gasoline machine. Possibly as many fire accidents have occurred with gasoline machines as with steamers—possibly not—I don't know—but I do know of several gasoline steamers having caught fire when the owners have sworn that there was no fire anywhere around.

I do know that a steamer can limp home while a gasoline machine will often lie down and refuse to go when nothing can be found out of order.

Finally, as Mr. Clough has already written in the HORSELESS AGE, the manufacturers of each type of machine have learned something from the other, and we users are getting the benefit of it, and are having something of a better feeling toward automobile manufacturers than we did when we were told, "Oh, there is no good of our going to that expense, as we can readily sell all the machines we make."

GEO. E. LONG.

OUR FOREIGN EXCHANGES

Automobiles in the German Manœuvres.

During the manœuvres of the German army at Mecklenburg in September, motor vehicles were used more extensively than ever before on such occasions. The number of vehicles at the disposal of the "motorwagon-division" being deemed insufficient, additional cars and motor cycles were rented from different manufacturers for the time of the manœuvres, so that the division had in its service a total of twenty-two cars and thirty-four motorcycles. The army authorities also issued a decree according to which officers of the reserve and militia who owned autos or motorcycles were allowed to make use of them in the manœuvres, which still further increased the number of motor-propelled vehicles taking part. One manufacturer alone furnished for the occasion a dozen 16-h. p. two-cylinder tonneau cars, against an indemnity, and motorcycles were furnished by all the more prominent German manufacturers. The operators of the vehicles were in part picked from the different infantry regiments and had to train in the care of motor vehicles before the machines could be intrusted to them; but, it is stated, they became proficient both practically and theoretically in a surprisingly short time.

A few of the cars belonging to the motor-division were put in service at the beginning of September, in the preparation for the manœuvres, but the majority started on September 5 on the trip to the district where the manœuvres were to be held.

It is reported that the tasks imposed on the motor vehicles were more severe this year than in any of the previous manœuvres, yet both the automobiles and motorcycles, with few exceptions, proved themselves equal thereto. The greatest difficulty encountered with the motorcycles was due to sandy fields through which their course led, and which often necessitated pushing the machines for some distance, causing delay in the delivery of dispatches. Cross-country runs also repeatedly proved disastrous to cars, which, of course, are operated to the best advantage only on well-kept roads. A lieutenant of the Fifteenth Hussars, shortly after the start of the manœuvres, broke an axle while driving at full speed, and was thrown out. He was quite severely injured but recovered. Another vehicle, delivering a dispatch at night, skidded into a ditch at a turn and broke a gear wheel. The repairs took two days, after which the car did excellent service again till the end of the manœuvres. The dispatch bearing cars maintained a speed of about 40 miles per hour on the better highways, and delivered messages at a distance of 25 miles in 40 minutes, while if the dispatches had been carried by dispatch bearers on horseback, it would have taken three times as long.

The vehicles were also repeatedly used by the officer in charge of the manœuvres to enable him to move quickly from place to place and see whether his orders were actually carried out.

COL. LORD LOUNSDALE IN HIS CAR AT THE AUTUMN MANŒUVRES.

If an inlet valve cotter pin accidentally drops out of the valve stem and into the cylinder, the best method to prevent damage is to remove the cylinder or cylinder head and take it out; but if the engine is a multi-cylinder one and the accident occurs on the road, it is advisable to take the spark plug out of the cylinder containing the cotter, and keep going on the other cylinders; the cotter will then most likely be thrown out through the spark plug hole.

A French manufacturer recommends that when forged parts of automobiles are accidentally bent, they should be straightened again hot, not cold. If straightened cold, a flaw is likely to develop that may prove dangerous.

The Automobile Club of France has installed a Renard fan dynamometer in its laboratory, to enable its members to have the power of their motors determined.

The French exports of automobiles during the first eight months of 1904 amounted to 49,476,000 francs, compared with 36,476,000 francs for the same period in 1903 and 19,891,000 francs in 1902. The imports were 2,357,000 francs in 1904; 666,000 francs in 1903, and 599 000 francs in 1902.

THE KAISER ARRIVING IN HIS AUTOMOBILE.

GRAND STAND AND CARS IN ENCLOSURE.

Brighton Beach Races.

It is estimated that 10,000 people were present at the Brighton Beach, N. Y., track on Saturday, October 21, to witness the first race meet promoted by the newly organized Brighton Beach Automobile Club. The programme was rather disappointing, and some among the attendance considered the event a veritable fiasco owing to the failure of Barney Oldfield to win or even make a good showing in any of the races in which he started. M. G. Bernin, driving W. Gould Brokaw's 60 H. P. Renault, which ran in the Vanderbilt Cup race, won two of the four events, the International and the Diamond Cup race, and finished second in the Brighton Handicap, thereby carrying off chief honors.

The first event was the Sea Breeze Handicap at one mile for cars selling for $1,000 or less, in which a car was allowed a handicap of one yard for each dollar its selling price is less than that figure. A Stanley steamer, driven by L. F. Baldwin, starting at 300 yards was never headed and won by nearly a quarter of a mile. Rodney Perler, in a 10 H. P. autocar, with a handicap of 100 yards, was second. The winner's time was 1:27 1-5.

Bernin, in the 60 H. P. Renault, and Guy W. Vaughan, in a 40 H. P. Decauville, were the only starters in the heat for French cars in the International Race. The distance of the trial heats was three miles. Bernin had no difficulty in winning from his rival, in 3:06 2-5. In the heat for American cars the starters were Oldfield with the Peerless "Green Dragon" and C. G. Wridgeway with a 24 H. P. Peerless. The former won by a good margin, and he, with Bernin and Paul Sartori, driving a 90 H. P. Fiat, who had won the heat for Italian cars by default, lined up for the final at five miles.

Oldfield had slightly the better of it at the first turn, but Sartori came abreast of him in the backstretch, while Bernin trailed about a length behind. During the second lap the latter gradually closed the distance between himself and Oldfield about twenty yards, and as the cars came down the stretch the leader ran to the outside of the track to make a wide turn, and in doing so allowed Bernin to run between him and the pole and take the lead. After this Oldfield slowed down appreciably, was passed by Sartori and finished third. The winner's time was 5:05 3-5.

The race for the Diamond Cup was virtually a repetition of the one just mentioned, except that Wridgeway (Peerless) took the place of Sartori (Fiat) and that Oldfield managed to keep ahead of the 24 H. P. car and finish second.

During the running of the Brighton Handicap, Wridgeway met with an accident, which might easily have had very serious results. While rounding the turn into the stretch the seat of his car broke loose and he was thrown backward onto the track. In the final heat of this race Philip Adams, driving a new 25 H. P. Standard racing car with a handicap of 115 seconds, won from Bernin (Renault), 25 seconds, by less than 100 yards, with Vaughan (Decauville), 45 seconds, fifty yards further back.

BERNIN (RENAULT) SKIDDING AROUND TURN.

MINOR MENTION

Automobilists of Washington, D. C., propose to organize a club.

There were 320 automobiles registered in Milwaukee on October 18.

The Welch Motor Car Co., of Pontiac, Mich., is negotiating for a larger factory.

Arrangements are being perfected for a race meet at Salt Lake City on or about November 25.

The Washington (D. C.) Automobile Dealers' Association has been incorporated with a capital of $10,000.

The Fisk Rubber Co., of Chicopee Falls, Mass., have opened a western sales office at 52 State street, Chicago.

W. Y. Dennis is building a brisk garage and repair station at 1401-1403 Hennepin avenue, Minneapolis, Minn.

The Springfield Metal Body Co., of Springfield, Mass., expect to move into a larger plant on November 1.

The proposed preliminary record trials at Ormond Beach in November have been declared off for want of entries.

It is proposed to hold a parade of decorated automobiles in connection with the Hallowe'en carnival in Pittsburg.

The Sherwood Manufacturing Co., of Buffalo, N. Y., have recently moved into a new factory on Elmwood avenue.

William Groth has taken the agency for the Oldsmobile in Appleton, Wis., and will soon open a garage and salesroom.

C. E. Yoder has been appointed manager of the recently organized Lent Automobile Manufacturing Co., of Kenton, Ohio.

R. A. Rainey and R. M. Owen, of New York City, have taken the sales management of the Reo Car Co., of Lansing, Mich.

A special straightaway course of a mile and a half for automobile racing is said to be in course of preparation at Lakewood, N. J.

The George N. Pierce Co., of Buffalo, will soon move their local salesroom into their new building adjoining the Teck Theatre.

The East Coast Automobile Co. has been organized in Jacksonville, Fla., and will soon occupy salesrooms at Ocean and Forsyth streets.

The Terre Haute (Ind.) Automobile Co. have let contracts for the erection of a two-story brick addition to their garage on Seventh street.

The Pope Motor Car Co. are building a 90 h. p. six-cylinder racing car at their Toledo factory for competition in the Ormond record trials.

Thomas B. Jeffery & Co. have established a warehouse at 1249-1251 North Twenty-seventh street, Philadelphia, in connection *with their local branch.*

The Missouri and Kansas Interstate Automobile Association is endeavoring to secure appropriations from the legislature for a turnpike between Kansas City and Leavenworth.

The Poppenberg Automobile Co., of Buffalo, have taken the agency for Rambler cars and will increase their salesroom by the addition of the adjoining store at 670 Main street.

The pastor of Grace M. E. Church, of Plainfield, N. J., is reported to have arranged that aged and infirm members of his congregation be brought to service in automobiles.

A parade of automobiles with sixty cars in line took place in Plainfield, N. J., on October 21. The mayors of Plainfield and North Plainfield and a number of city officials participated.

The Studebaker Bros. Mfg. Co. ask us to state that they have no selling agency contract with the Union Automobile Co., of Boston, Mass., as was erroneously announced in a recent issue.

The Diamond Rubber Co. have established branches at 3966 Olive street, Chicago, and at 611 First avenue, South Minneapolis. R. L. McCrea is in charge of the former and W. E. Roby of the latter.

The Fisk Rubber Co., the Diamond Rubber Co. and the Auto Equipment Co. will soon move their local offices into a new building which is being erected at Brush street and Jefferson avenue, Detroit, Mich.

The American Canvas and Tarpaulin Corporation, recently organized in Buffalo, N. Y., with offices at 45 North Division street, devote a part of their attention to the manufacture of covers for automobiles.

Vernon Middleton, of Urbana, Ohio, was killed, and Mrs. Virginia Hundley possibly fatally injured, when the former's car ran off a bridge over the Mad River, near Springfield, and landed on a pile of rocks below.

The Pungs-Finch Auto and Gas Engine Co. has been organized in Detroit, Mich., with a capital stock of $200,000. It is stated that the common stock has been paid in the property and patents of the Sintz Gas Engine Co.

A new company has been organized in Warren, Pa., to manufacture a four-cylinder gasoline touring car. C. S. Knabb is president; P. S. Horton, secretary and treasurer, and H. E. Barnhart, general manager.

Long Island residents are protesting against the condition of the "oiled triangle" used in the Vanderbilt Cup race. After the rain last week the course became slippery and there is now talk of spreading sand and loam over it.

The Buffalo (N. Y.) Electric Carriage Co. have moved into new quarters at 240 West Utica street. They will reorganize and expect to put out a line of closed vehicles, as well as their Stanhope model, during the coming year.

At a matinee race meet held by the Cleveland Automobile Club on October 19, Charles Gorndt (Winton) was timed for fifty miles in 55:42, and Earl Kiser (Winton), for twenty-five miles in 28:40 2-5. If allowed, these are new records.

W. E. Mack, of South Bend, Ind., has sent in some photographs of a double hub wheel invented by Dr. H. H. Taylor. The outer hub is connected to the inner one by twelve spiral springs, and the arrangement is claimed to make pneumatic tires unnecessary.

A six-event race meet was held at Dallas, Texas, on October 16, under the auspices of the local automobile club. The winners were: Cecil Kinser (Buckboard), C. J. Chabot (Autocar), E. H. R. Green (Franklin), Henry Hill (White), and Dr. E. Wilson (Franklin).

George C. Stevens, an insurance man of New York City, accidentally set fire to his private garage in Summit, N. J., on October 18. In striking a match to light the lamps on his car, the gas, which had accumulated within the place ignited, and the explosion which followed shocked Mr. Stevens badly.

A twenty-mile match race to be run at Empire track, Yonkers, N. Y., is said to have been arranged between Leon Thery, with the Richard-Brasier car in which he won the Gordon Bennett Cup this year, and Paul Sartori, with Vanderbilt's Fiat. The date set is October 29. Other events will be arranged for the same afternoon.

The Brighton Beach (N. Y.) Automobile Club has been incorporated to "conduct races, exhibitions and endurance tests of automobiles, and to manufacture and sell self-propelling machinery. The directors are: William A. Engeman, who is also president of the Brighton Beach Racing Association; A. H. Battersby and C. H. Hyde.

The American Automobile Agency, Ferrari & Co., 6 Via Ponte Seveso, Milan, has been formed to introduce American automobiles in Italy. They claim to have the necessary capital and technical talent to enable them to carry a large stock and give satisfactory treatment to customers, and they solicit agency proposals from American manufacturers.

The programme for the Eagle Rock, N. J., hill climbing contest to be held on Thanksgiving Day contains eleven events; one for steam cars, another for electrics and nine for gasoline cars. The last mentioned are divided into classes as follows: List price, $850 and under; list price, $850 to $1,250; list price to $2,000; list price to $3,000; list price to $5,000; list price above $5,000; for cars weighing 1,432 to 2,204 pounds; for cars weighing 851 to 1,432 pounds; for cars weighing 551 to 851 pounds. Entries may be made with C. H. Gillette, 31 East Forty-second street, New York City.

MOTOR VEHICLE PATENTS.

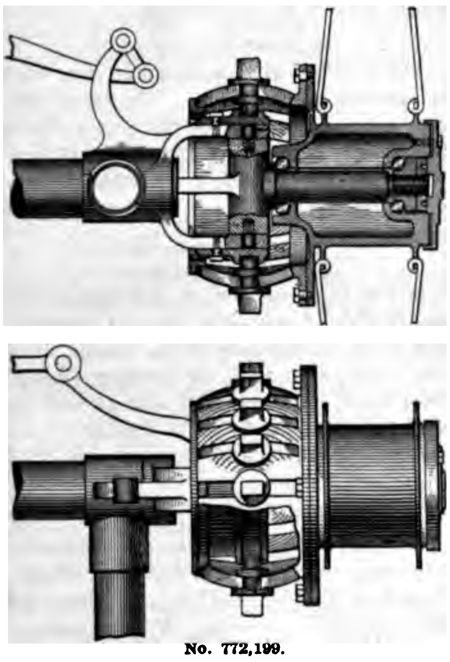
United States Patents.

772,235. Electric Igniter for Explosive Engines.—Wm. B. Hayden, of New York, N. Y. October 11, 1904. Filed February 15, 1904.

The novel feature is a contact device comprising a reciprocating rod carrying an insulated pin adapted to make contact with a spring blade when nearing the end of its motion in one direction the position of the free end of the spring blade can be varied by means of a cam resting against the blade near the middle of its length, and thus the time of ignition varied.

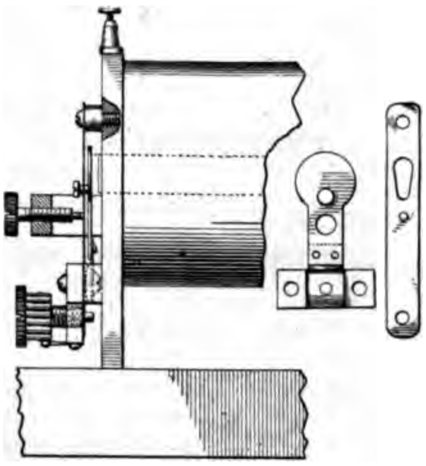
772,199. Vehicle.—Joseph A. Williams, of Cleveland, O. October 11, 1904. Filed June 16, 1904.

This invention is the result of another attempt to solve the problem of a combined steering and driving wheel. An axle stub is pivoted to a forked axle end in the usual manner. To the hub of the steering wheel is secured a spherical shell, the center of



No. 772,199.

which is located at the intersection of the hub center line and the pivot center line. This shell is provided with a series of equidistant slots lying along circumferential lines of the shell and extending parallel to the axis of the wheel. In each of these slots operates a driving projection or tooth having a flange contacting with the interior of the shell, and a flange resting upon the exterior thereof, the adjacent faces of the flanges being curved to conform to the surfaces of the shell. These flanges serve to prevent longitudinal movement of the teeth through the slots. At the inner end of each tooth is a cylindrical projection which extends into a peripheral groove in an annulus or guiding member secured to the forked axle end. In one form of the invention a sprocket wheel is secured to the teeth, and owing to the guiding action of the ring secured to the axle end, the sprocket will always remain in a plane perpendicular to the axle, and in driving connection with the wheel, whether the steering knuckle stands straight or at an angle.



No. 772,438.

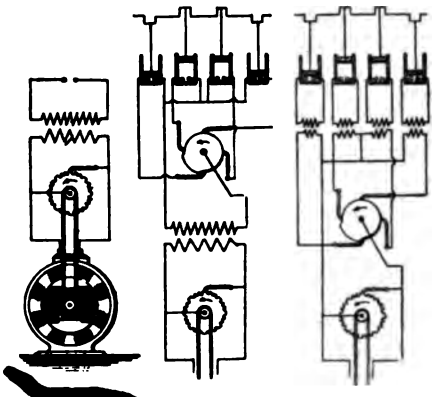
772,438. Vibrator.—Charles F. Splitdorf, of New York, N. Y. October 18, 1904. Filed January 23, 1904.

This invention relates to an improvement in induction coil vibrators whereby a higher rate of vibration is claimed to be made possible. A movable contact carrier is provided, consisting of a strip or ribbon of thin spring metal carrying the usual movable contact that forms one of the electrodes in circuit-interrupting mechanism. The spring is rigidly held at its opposite ends under tension which can be adjusted as desired. An armature is arranged in the field of the electro-magnet and is provided with a rigid connection or stud adapted to hammer the spring to separate the movable contact from the stationary contact, and to set up a vibratory action in the spring. The spring is supported in approximate parallelism with the armature, and is disposed about centrally between the armature and the head of the stud, the space separating the spring and the head being less than the space separating the armature and the core. Thus upon energizing the electro-magnet the armature in its attracted movement toward the core causes the stud-head to strike or hammer the spring, which vibrates at a speed commensurate with the degree of its tension, thereby making and breaking contact between the contact points many times in the course of such armature movement. The armature in its return movement upon demagnetization of the core strikes the vibrating spring, serving the double purpose of limiting the outward path of the armature and of maintaining the vibratory action of the spring.

772,856. Sparking Plug for Combustion Engines.—Charles H. Wisner, of Flint, Mich. October 18, 1904. Filed July 24, 1902.

A sparking device for explosive-engines comprising a tubular electrode, having bores of different diameter, a piece of insulating material across the larger bore for closing the same and arranged at a distance from the bottom thereof, and an electrode supported by said material and arranged in proximity to the inner end of the tubular electrode.

772,649. Sparking Igniter.—Ernest Eisemann, of Stuttgart, Germany. October 18, 1904. Filed April 12, 1902.

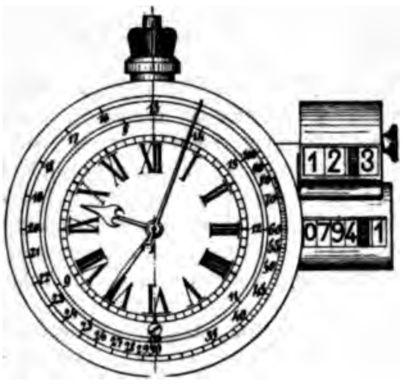


No. 772,649.

A synchronously-running contact-disk is connected with the current-producer, which is of high self-induction. A spring rubs on the contact-disk and periodically short-circuits the current-producer by the rotation of the contact-disk and switches in or out the primary of an induction-coil connected with the current-producer. On each interruption of the short circuit there passes through the coil, in addition to the current of the producer, an extra quantity of current resulting from the cessation of the short circuit, this current being in the same direction, so that it is added to the former. The consequence is the formation of an induced current of considerable potential in the secondary circuit of the induction-coil, which causes sparks to pass across between the sparking points.

In using alternating-current generators, the division of the contact-disk coincides with the number of changes of polarity. The stream of sparks for igniting explosive mixtures may be produced by the use of a contact-wheel, running synchronously with the contact-disk and a number of circuit-closing springs, corresponding to the number of cylinders, by means of which springs the switching on and off of the sparking current at the separate cylinders is effected at the same times that the primary circuit of the induction-coil is short-circuited by the contact-disk and spring, the coil being thus rendered void of current with the object of avoiding sparking at the place of contact.

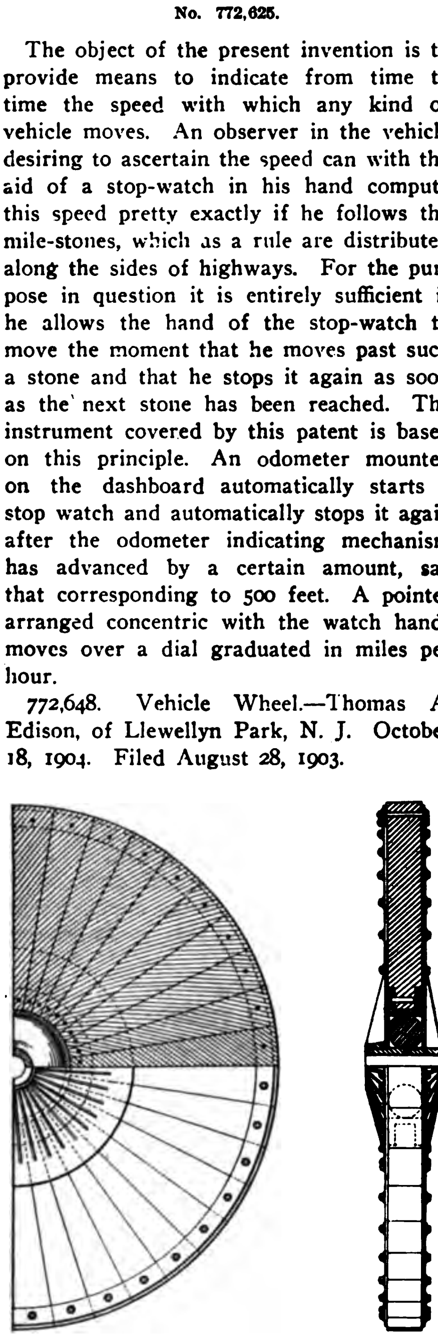
772,625. Speed Indicating Apparatus.—Fritz Montandon, of La Chaux-de-Fonds, Switzerland. October 18, 1904. Filed August 18, 1902.



No. 772,625.

The object of the present invention is to provide means to indicate from time to time the speed with which any kind of vehicle moves. An observer in the vehicle desiring to ascertain the speed can with the aid of a stop-watch in his hand compute this speed pretty exactly if he follows the mile-stones, which as a rule are distributed along the sides of highways. For the purpose in question it is entirely sufficient if he allows the hand of the stop-watch to move the moment that he moves past such a stone and that he stops it again as soon as the next stone has been reached. The instrument covered by this patent is based on this principle. An odometer mounted on the dashboard automatically starts a stop watch and automatically stops it again after the odometer indicating mechanism has advanced by a certain amount, say that corresponding to 500 feet. A pointer arranged concentric with the watch hands moves over a dial graduated in miles per hour.

772,648. Vehicle Wheel.—Thomas A. Edison, of Llewellyn Park, N. J. October 18, 1904. Filed August 28, 1903.



No. 772,648.

The invention consists of a wheel in the form of a disk built up of sections of endogenous wood—palm wood, for instance—secured together and mounted between the flanges of a suitable hub, with an elastic cushion interposed between the disk and the body of the hub, whereby the disk is free to move elastically with respect to the hub, so as to accommodate itself to the small inequalities of the road surface. The elastic cushion is made in the form of a continuous ring of pure vulcanized Para rubber, owing to the extreme resiliency of this material. It become possible to use pure rubber in this way, for the reason that it is not subjected to wearing or abrading influences, but is merely displaced or distorted, while at the same time it is substantially protected from harmful atmospheric conditions.

World's Fair Awards.

The judges of the automobile department of the St. Louis World's Fair have made awards as follows:

To American manufacturers—Grand prizes to: Woods Motor Vehicle Co., White Sewing Machine Co., Pope Motor Car Co., Haynes-Apperson Co., George N. Pierce Co.

Gold Medals to: Knox Automobile Co., Electric Vehicle Co., Hendu Mfg. Co., Badger Bros. Mfg. Co., Packard Motor Vehicle Co., Shelby Steel Tube Co., Veeder Mfg. Co., Vehicle Equipment Co.

Silver Medals to: Cadillac Automobile Co., Ford Motor Co., H. H. Franklin Mfg. Co., Gray & Davis, Grout Bros., Thomas B. Jeffery & Co., Olds Motor Works, Smith & Mabley, St. Louis Motor Carriage Co., E. R. Thomas Motor Co., and Winton Motor Carriage Co.

Bronze Medal to: Dayton Electrical Mfg. Co., Duryea Power Co., Motsinger Device Mfg. Co., Royal Motor Co., Twentieth Century Mfg. Co., and Waltham Mfg. Co.

To foreign manufacturers—Grand Prizes to: Renault Bros., Panhard & Levassor, Daimler Co., De Dietrich Co., George-Richard Co.

Gold Medals to: Darracq & Co. and Benz & Co.

Commercial Vehicle Notes.

At the request of the cab men, the Boston police board is securing the names of all persons who make a business of renting out automobiles, with a view to taking some action regarding the rates charged.

The Allegheny County (Pa.) Light Co. has purchased a White car for use in making inspection trips between stations.

The Springfield, Mass., police board have ordered their new patrol wagon from the Knox Automobile Co. of that city.

It is reported that Captain John Bergfeld is to establish an automobile line in St. Louis which will connect with electric car lines and railroad depots.

It is said that a company has recently been organized in Washington, D. C., to operate a line of electric vehicles along the routes of the present herdic lines. Hack Inspector Lamb has reported that the coaches now in use are in an unsightly and unsanitary condition.

Club Notes

NEW HAMPSHIRE A. C.

The clubhouse at Hampton has been closed for the winter. Rooms have been leased in the Merrill Block, Manchester.

BURLINGTON (VT.) A. C.

The club was organized recently. Dr. D. C. Hawley was elected president; O. S. Presbrey, vice-president; E. A. Brodie, secretary; G. A. Churchill, treasurer. The new organization has already twenty-five members.

PRINCETON UNVERSITY A. C.

Thirty automobilists of Princeton University have formed the above club, and elected officers as follows: Charles Frick, president; S. H. Bird, vice-president, and J. S. Martin, secretary. Efforts will be made to secure a club garage.

A. C. A.

The Board of Governors has suspended Harry Harkness from the club until December 13 for disregarding the speed laws of Massachusetts, Connecticut and New York in making his record run from Boston to New York in June last.

ROCKFORD (ILL.) A. C.

The question of an automobile race track is agitating the members. The street railway company has offered the club a site in the vicinity of Harlem Park with the provision that the members undertake to construct the track, fence it and erect grandstands, etc.

BUFFALO (N. Y.) A. C.

It has been decided to co-operate with the Buffalo Automobile Dealers' Association in the management of the coming show. The club entertained the visiting Queen's Own Rifles on October 23 with an automobile ride about the City. It is probable that new rooms will soon be secured in the Teck Theatre building.

OSHKOSH (WIS.) A. C.

The club recently completed its organization and elected the following officers: President, Dr. H. B. Dale; vice-president, A. H. Meyer; secretary, W. J. Campbell; treasurer, Frank Gates, and captain, H. E. Johnson. Dr. Titus and Messrs. Gates and Chase were appointed a committee on membership. Meetings will be held monthly.

A. C. OF KANSAS CITY.

L. C. Boyle, attorney for the club, has been instructed to bring action to test the validity of the new ordinance, especially the part relating to the examining and licensing of operators. The club secretary is corresponding with the other clubs in the State looking toward united action to secure amendments to the State automobile law, which makes it necessary for an automobilist to register in every county he wishes to drive in.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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West Virginia, Anti-Automobile State

The County Court of Grand County, W. Va., early last month passed an order prohibiting absolutely the use of automobiles on the highways, authorizing the arrest of all persons found using automobiles, and fixing a fine of $100 for all violations. A couple of weeks later the County Court of Mason County, W. Va., passed an order that automobiles must not be run on the highways of the territory under its jurisdiction at a greater rate of speed than five miles per hour, and that on meeting any person on the road with a team or a horse or other stock, the driver of the automobile must slow down and stop until the team, etc., has passed and is beyond danger. In case an automobilist fails to comply with this order, he is held responsible for all damages that may occur.

These two court orders are to all intents and purposes alike, for the latter amounts virtually to a total prohibition, as no automobile could possibly be operated in compliance with it. It is most likely that other county courts in the same and neighboring States will follow these examples, and there is therefore need of immediate and energetic action on the part of some interested organization or sprouting automobile development in the South will be seriously endangered, and touring through that section rendered impossible. The organization most vitally interested is the National Association of Automobile Manufacturers, as will be evidenced by a letter from a reader in Point Pleasant, Mason County, W. Va., recently received at this office. Our correspondent states that there are at present only two automobiles owned in that county, and no runaways or accidents have been caused by them, so there is really no justification whatever for the court's order. "With this law in force," says our correspondent, who is one of the two owners in the county, "automobiling is at an end here, for it would be impossible to keep within the speed limit.

"I would like to know whether a county court can pass such an unreasonable law and enforce it, as I had hoped to sell several machines here next spring?"

The only feasible method of avoiding the constant molestation of automobilists and the annoyance of unreasonable speed restrictions by petty local authorities is to get a State law passed that provides uniform speed limits, which cannot be reduced by local authorities. Such a law is now in force in New York and several other States. If the fifty to sixty automobilists in West Virginia would organize a State association and petition the Legislature for a State automobile law, based upon those in States in which the movement has reached greater development, we believe they would be accorded a hearing, especially if they had the support of the American Automobile Association, which could undoubtedly be enlisted in the cause.

Contrary to certain elements in the automobile movement, we believe that good results could be achieved by means of an aggressive legislative campaign by the leading national organizations and local automobilists in States which have as yet no automobile laws. By pointing to the examples set by some of the older automobile States and appealing to the intelligence and broadmindedness of the State legislators, we believe more liberal regulations could invariably be secured than if the matter is left entirely to prejudiced and to pettyfogging local authorities and no organized effort is made to assert the rights of automobilists, as is now the case in these newer sections, where the automobile is just being introduced among the people.

Some Cold Weather Suggestions.

In unusually cold weather difficulty is frequently met in starting the engine, as the gasoline may not vaporize and the charge around the spark points may be so weak in gasoline vapor that it will not ignite. If much trouble is encountered from this cause, it is well to use a lighter grade of gasoline as long as the low temperature persists. In this connection, it should be remembered that in cold weather gasoline gives a lower test than standard, which is based on a temperature of 60 degrees Fahrenheit. At zero Fahrenheit it shows actually 8 degrees less than its standard test; hence an allowance for temperature should always be made when testing gasoline in cold weather.

If it is found impossible to start the motor after repeated trials, and the low temperature is thought to be the cause, it is advisable to apply to the inlet pipe a rag soaked in hot water; or, better still, fill the cooling system with hot water (or cooling solution). This latter method has the further advantage that it heats the surface on which the piston travels, and therefore insures better cylinder lubrication from the start.

Low temperatures materially increase the viscosity of lubricating oil, and it may be found impossible to adjust the lubricator to give the proper flow, particularly if the latter is of the gravity feed type. If such is the case, it is advisable to dilute the oil with kerosene until its viscosity is reduced to that of normal temperatures.

When it is found necessary to let a car stand outside in cold weather for considerable periods, it is a good plan to cover the bonnet or rear part of the body, whichever contains the motor, with a heavy blanket or robe, which will retain the heat for hours. Some operators prefer to keep the motor running at a low speed, but if it can be kept warm by the above simple expedient, it is, of course, much preferable, as wear and waste of gasoline are then avoided.

Finally, it is perhaps not amiss to call attention to the fact that extremely low temperatures render steel brittle, and that it is advisable not to use a car too severely in zero weather, as an axle is more liable to snap than under ordinary conditions, especially if the car is driven at speed over rough, frozen roads.

Many of the foregoing possible difficulties are avoided if the car is kept in a heated house, and most of the suggestions apply only to cases where the cars are used occasionally only, and are kept in unheated places.

Metric Standards on Foreign Cars.

One obstacle to the successful use of foreign-made cars in this country that has never before been mentioned, so far as we are aware, is the fact that all gears and screws on them are of metric pitch, and if broken or damaged, can be renewed only by the importers and a limited number of repair shops. That the gears are of different pitch from the standard in this country, is perhaps a less serious matter, as gear wheels need be renewed, because of wear or breakage on rare occasions only, and in any case it requires a well-equipped machine shop to furnish a properly cut and hardened steel gear. On the other hand, the irregular pitch of screw threads is a matter of far greater importance.. On French motors, for instance, a great many studs are generally used, and although the nuts on them are now invariably secured with split pins, the latter will shear off occasionally and the nuts be lost. This mishap would be of little moment if the stud were cut with standard threads, for even if the operator had no spare nut to fit the stud in his tool box, he would be almost certain to find one at the nearest machine shop. But if the stud is cut with metric threads, it will be very difficult to find a repair shop where the nut can be duplicated. The usual method of proceeding in such a case is to take out the old stud, retap the hole for it to the next larger standard pitch, make a new stud cut with a thread of this pitch, and use a corresponding nut. In this manner an effective repair can be made, but at greater expense than if the thread had been standard, and, besides, the car will in course of time contain studs and screws with a variety of threads, which is decidedly objectionable.

This use of metric standards in all machine work cannot fail to be a source of annoyance to owners of foreign cars, particularly cars in an advanced state of wear, and hence requiring repairs more frequently.

Speeds and Legislative Speed Limits.

The suggestion made in a communication in the present issue that legislators should be given demonstration rides in cars fitted with speed indicators is a good one, and deserves to be put into practice. Experienced automobilists, even of the most conservative class, agree that the speed limit of 15 miles an hour for the open country, as fixed by statute in a number of States, Connecticut and Massachusetts, for instance, is entirely too low, and is constantly being exceeded by drivers who could not possibly be classed as habitual scorchers. Twenty miles per hour for the open country is far more reasonable than 15 miles, although the former is still too low if a driver is liable to arrest for barely exceeding it by persons who may be lying in ambush at some deserted point along the road, as is the custom of the so-called police traps. The difference between 20 and 15 miles in respect to safety is greater than it may seem. At 20 miles an hour a car can only be stopped by the brakes in practically twice the distance as at 15 miles, and the force of the impact in case of a collision is practically twice as great. At 45 miles an hour, which is the approximate limit of speed of most large touring cars as now constructed, the distance necessary to effect a stop, and the impact in case of collision are nine times as great as at 15 miles per hour. These facts deserve careful consideration in determining suitable speed limits, and while the present limits are almost without exception too low, it would be a great mistake to advance the limit to correspond with the highest speed at which the big touring cars can travel.

In regard to speed limits in built-up districts, they are also almost invariably too low, and no general limit under 10 miles per hour can be considered justified, for while there may be many sections in large cities where traffic conditions render such a speed dangerous, the drivers are restrained by the clause prohibiting driving at "a speed greater than is reasonable and proper, having regard to the safety of other road users," which is found in every automobile law. If the speed limit for the whole of Manhattan were to be fixed at a figure which is reasonable and proper for Nassau street at noontime, for instance, automobiling would be well nigh impossible in the city.

Let automobilists, therefore, both club members and unattached, who carry speed indicators on their cars take "the authorities" on demonstration trips and show them that the usual speed limits are too low for advantageous use of the machines, and lower than is required by considera-

tions of public safety. A little ocular proof of this sort will be more effective than a bushel of argumentative evidence, and should result in legislation which, while tending to suppress the speed maniac going at 35 to 40 miles per hour, will not interfere with the legitimate and advantageous use of automobiles.

Lowering the Gear of Cars.

Conversation with a large number of automobile users who employ their cars for business purposes or for pleasure, rather than for sport, elicits the fact that there is a considerable tendency toward the employment of vehicles geared lower than formerly. There are several reasons for this. Users of this class have, in many instances, found that running a motor vehicle over ordinary roads at a speed averaging much in excess of 14 or 15 miles per hour, is attended with a degree of nervous strain, which, if continued for long periods, renders motoring fatiguing rather than restful and pleasurable. Automobile accidents, arising, as they almost always do, from indulgence in too high speeds, have impressed the more conservative class of motorists with the dangers of fast running. The realization of the rapid deterioration of tires and of car mechanism, due to fast driving, and the large repair bills which this practice entails, have also caused an appreciation of the fact that high speed is an expensive and doubtful luxury.

But more effective than these considerations, in its creation of a sentiment toward low gearing, have been the legal restrictions against high speeds which have become practically universal, and the enforcement of which is demanded by public sentiment. It may be stated with confidence that there exists a large demand among careful, moderate and law abiding motorists, for a vehicle having a maximum speed very little in excess of twenty miles per hour. This specification is usually coupled with the requirement that the car shall be able to overcome all ordinary road difficulties on the direct drive. To meet these demands, a car of very considerable power and geared quite low is required. Such a vehicle possesses qualities which render its driving highly satisfactory to a growing class of practical users of cars who have never subscribed to the speed craze. A car of this kind possesses a very large reserve power and is ordinarily driven under close throttle control, but when hard work is demanded, this reserve is always available, and may be drawn upon for hill climbing and for negotiating sandy roads, usually without a change of gear. The perfection of engine speed control through throttle and spark adjustment which has been attained in good, modern motors, together with low gearing, enables the ideal of "gearlessness" in a gasoline vehicle to be practically attained. The direct drive may be made sufficiently powerful, through low gearing, to carry over all but the very worst road conditions, the trouble of gear changing may be all but eliminated, the temptation toward speed excesses done away with and the operation of the car reduced to the simplest possible terms—the manipulation of the throttle and occasionally of the clutch. Upon smooth, level highways, this gearing down of a car, obviously reduces its effective road speed, but not below the legal limit, of course. On hard, hilly or sandy roads, however, the actual running speed of the machine will be little, if any, reduced by a judicious reduction of the gear, as the car will be capable of operation upon the direct drive during a so much larger portion of the t[illegible] A moderate but continuously maintained rate of speed, over hill and dale, is what an increasing body of users seem to be desiring, and low gearing will effect this desired end. In city driving, the car may be operated upon the direct drive a greater proportion of the time, without danger and with the machine still under perfect speed control.

"Gearing down" not only increases the power of the direct drive, but renders the lower gears so strong, in their tractive ability, as to effectually banish any possibility of the car's stalling, under any possible road conditions, where traction may be secured.

Of course the engine of a car which has been geared down may be required to make more revolutions per mile traveled, especially over good roads, and may thus be subjected to a little additional wear, but the fact that it will be so closely throttled, during a large portion of the time, and its parts subjected to such moderate stresses, will be found largely to counterbalance these objections.

The degree of comfort which a moderately geared car of ample power will be found to possess in actual, lawful use, should, it would seem, move many automobilists to substantial reductions in their gears and in turn lead manufacturers of practical machines in the same direction.

Growing Demand for Magnetos.

While mechanical ignition generators have been fitted to some cars almost from the beginning of the industry in this country, and there has always been a variety of such generators on the market, they have not to this date found extensive application.

Until recently, American automobile manufacturers pinned their faith chiefly to single and double-cylinder cars, which consume a comparatively small amount of electric current in their ignition apparatus, and the almost universal source of current has been the dry battery, which for purposes in which the demand for current is small and intermittent, is at once the most reliable and the most inexpensive source. It is far less satisfactory, however, when the drain on it is strong and continuous, as in a four-cylinder engine, and with the recent tendency toward an increased number of cylinders, the indications are that the more powerful sources of ignition current, viz., storage batteries and mechanical generators, will meet a much greater demand in the near future. The change of conditions has to a certain extent been anticipated by the storage battery manufacturers, who have lately shown considerable activity in endeavoring to impress automobile manufacturers with the merits of their particular batteries; and mechanical generator makers no doubt have also recognized their opportunities.

If long experience counts for anything, it may be asserted positively that as a source of ignition current for four-cylinder cars the dry battery is unsuitable. The oldest American manufacturer of this type of car has used a dynamo from the start, and, we learn, has not been able to obtain a dry battery of standard size capable of standing up for 200 miles. Abroad, although one automobile manufacturer makes a dry battery of excellent reputation that is used extensively on voiturettes, this source of current has never been used to any extent on four-cylinder machines.

As indicative of the latest tendencies of manufacturers in working out the ignition problem, it is significant that, as reported in our last issue, one of the most prominent French manufacturers has adopted high tension magneto ignition, and a leading American manufacturer is reported to have decided on the use of the same system on his 1905 models.

How to Locate Abnormal Friction in the Transmission.

By Albert L. Clough.

It not infrequently happens that an automobile motor is blamed for a loss of power with which it is not justly chargeable, the fact of the case sometimes being that there is an unusual drag imposed upon the engine owing to some portion of the car having developed an abnormal frictional resistance through lack of lubrication or some other cause. This supposed lack of power is generally first realized from the development of an inability to surmount certain grades on the high gear which have customarily been negotiated by it with comparative ease; or it may make itself felt by its becoming necessary to open the throttle or to advance the spark further than usual in order to gain a certain speed upon the level.

Before assuming that the engine is weak, it is well to try the experiment of pushing the car by hand both backward and forward over the level stable floor with clutches and brakes in their released positions and noting whether more effort than usual is required. In order to judge of this, one should become accustomed to the amount of force normally required to move the vehicle under these conditions. If the car has sliding gears, the experiment should be tried with the "high" in engagement. Then, too, a little attention paid to the action of the car while coasting, free from the engine, may be of value in this connection. If the machine fails to run by gravity as far as usual upon a certain grade under ordinary road conditions, something may be binding and holding the vehicle back, producing an effect which, under other conditions, might not unnaturally be attributed to loss of engine power.

GEAR-SETTING FOR COASTING.

By the way, when a machine with sliding gears is allowed to coast, the gears should either be thrown out of mesh—that is, into the "neutral" position, so that none of them are turning at all, or, still better, be placed in the "high" position, so that they may be revolving at a minimum speed and thus consuming the least possible amount of power.

Careful attention paid to the force required to push the car and to its coasting ability, will generally enable one to discriminate between faulty operation due to a weak engine and sluggish action of the car due to unusual frictional resistances.

LOCAL HEATING A GUIDE.

If there is reason to believe that some moving part is demanding an abnormal amount of power, it becomes necessary to locate the difficulty. Just after the machine has come in from a brisk run, one may sometimes determine where the difficulty is by searching for signs of heat by means of the hand—feeling the front and rear bearings and those of the countershaft, the brake bands, drums and shoes, the clutch drums and bands and the bearings of the change speed gear shafts, as well as the bearings of the shaft drive (in case one is employed).

BLOCKING CAR UP.

It is a still better arrangement to block all four wheels clear of the floor (securely, so that there shall be no danger of the machine running away) and to run the car for a considerable length of time on the high gear and then feel for evidences of heat at the points above enumerated. The front wheels may be spun by hand and any lack of freedom in their motions noted and corrected. Perhaps their ball or roller bearings may be in too tight adjustment, a ball may be broken or a cone may have proved soft and become cut badly, or lack of sufficient lubrication may be the only trouble. A good opportunity will also be afforded to see whether the chain is running freely, without any tendency to ride the sprockets either on the forward or reverse motions. When blocked up the engine ought not to be slowed down perceptibly when the high speed clutch is engaged, except at the instant when the connection is made. Any large loss of engine speed may be taken as an indication of the pressure of unusual friction.

In case any evidence of heat is found in the rear wheel or axle bearings, it may be due to defective adjustment, broken balls or to lack of lubrication, and the cause should at once be removed so that the rear axle will spin freely for quite a while when the chain is off.

DRAGGING BRAKES.

If the brakes are found to become heated, an adjustment may usually be found which will secure the complete freeing of the braking surfaces when the brakes are off, and still not prevent their energetic engagement when applied. A dragging clutch is likely to become evident when the machine is jacked up, as motion may be communicated to the wheels although the clutch is nominally thrown out. This is a matter of adjustment which can usually be handled without much difficulty. Countershaft bearings are frequently neglected, as to their lubrication, and when in this condition they waste a great deal of power in their plain bearings which, when they have run dry, may have to be scraped to insure against heating in the future. If lubrication has not been continuously furnished to the shafts of the change speed gear, they will waste a great deal of power. In machines employing sliding gears, the manual power required to spin the rear wheels with the gear shifter in its neutral position and with the shifter on "high," may both be noted, and some idea gained as to whether the gear shafts are running as freely as ought to be expected. A sprung gear shaft or countershaft may be the cause of much loss of power.

EXCESSIVE ENGINE FRICTION.

Internal friction in the engine may also be a cause of the faulty performance of the car. If, with the relief cocks open, the motor does not crank with perfect freedom, even after a hard run, it may well be that, although it develops its full power, a considerable proportion of it is wasted in overcoming piston or bearing friction.

The main bearings, or those of the secondary shaft may be dry, or their shafts may have become sprung through some accident. Possibly the supply of oil to the pistons may be insufficient, in which case the loss of effective power may be almost complete, and easily detected by the rapidity with which the cooling water boils away. Copious lubrication is the obvious remedy for these difficulties.

In general, it may be said that frequent attention to the easy running qualities of the car as a wheeled vehicle, and to the freedom of movement of the engine and all shafts related to the transmission of the power, often results in clearing the motor of an unjust imputation of shirking its duty. It may also have the result of greatly reducing the fuel bill, adding considerably to the life of wearing parts and of increasing very noticeably the speed and hill climbing power of the car. The writer's personal practice is to push the car by hand over the stable floor on each occasion when he returns from a run, both forward and backward, and also to crank the engine over a few times. In that way such a degree of familiarity in regard to the car's running qualities is achieved that any changes therein are immediately noticed.

Sprags.

By Julian C. Chase.

The necessity for providing some positive means of preventing a car from runnig down hill if the brakes fail for any reason, is being more and more generally appreciated by American manufacturers, and a few now regularly equip their cars with a safety device of this kind. Nearly all cars are now fitted with two sets of brakes, and in many cases these are both of the double acting type and are actually capable of stopping and holding the car on any hill in either direction. Experience has demonstrated, however, that further safety devices are necessary for travel in very hilly sections of the country.

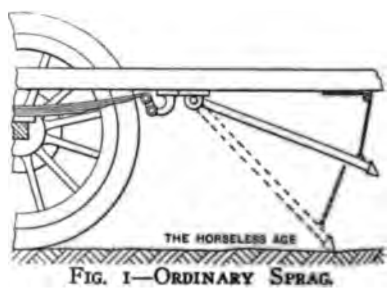


Fig. 1—Ordinary Sprag.

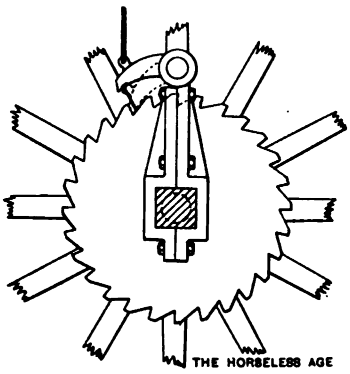


Fig. 2—Ratchet Sprag.

Occasion for the use of a sprag results usually from the failure of the operator to "catch" a gear in shifting from one to another, or the breaking of a driving chain, or some part of the transmission, when the car is climbing a steep hill. In either case the car begins to run backwards, and if for any reason its progress cannot be checked by the brakes, and no sprag is fitted, disaster is imminent, and the probable results will depend more upon the topographical conditions than upon the skill of the operator.

A sprag is actually needed only under the worst possible conditions, as ordinarily a well designed brake in good order will answer all requirements. Under certain conditions, however, brakes are likely to fail. If in running backwards the car has rolled on to a piece of very slippery ground, such as is often found at the side of hilly roads, and has acquired a considerable momentum during the brief interval required by the operator to make up his mind what is the best thing to do, the application of the brakes, even if they lock the wheels, may not save the car from being "ditched." Besides, it is precisely under the most dangerous touring conditions, viz., when the roads are slippery and muddy, that the brakes are likely to fail, owing to being covered with mud, if they are exposed.

A sprag, then, should be absolutely positive, and not dependent for its successful action upon conditions which affect the usefulness of the brakes. This fact is emphasized by accidents which have occurred lately through the failure of the brakes to hold cars from running backward on hills.

There are three general types of sprags which are the more commonly used to-day,

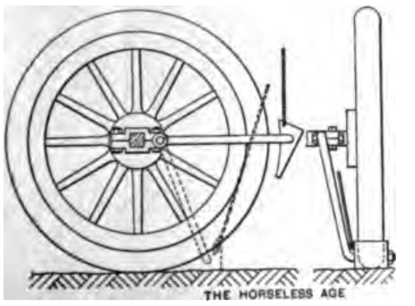


Fig. 3—Block Sprag.

viz., the ratchet wheel and pawl, the hinged blocks, and the bar or prong. The last is the oldest type and by far the most common.

In the first mentioned type, a ratchet wheel is secured to each driving wheel hub and a pawl secured to some stationary part and so arranged that it can be brought into engagement with the ratchet at the will of the operator, thereby locking the wheel against any backward movement. It will be seen that this practically constitutes a locked brake, and that its effectiveness in bringing the car to a stop depends only upon the amount of friction between the tires and the ground. Under the worst conditions, and consequently when most needed, it may fail to perform its functions, but under ordinary conditions it would serve the purpose well enough.

The second form of sprag consists of a pair of V shaped wooden blocks which are hinged eccentrically from the rear axle by means of rods. When lifted, they clear the rear of the wheels by a considerable margin, but when dropped to the ground, they

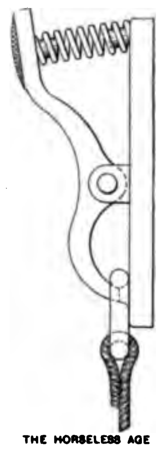


Fig. 4—Snap for Releasing Sprag.

fit against the wheels and prevent them from rolling backward. This type is considerably heavier than the one just mentioned, and more bulky, but it should be somewhat more reliable, as the blocks would sink slightly into the surface of a soft road and prevent the car from sliding even on a very greasy surface

The third form consists of a metal bar or prong which is hinged at the forward end to the frame of the car, and is of such length that it will form an angle of about 45 degrees with the road when its free end is dropped. This form of sprag is not dependent upon good road surface for its successful action, as it digs into the ground and will hold even in a very soft spot. The bar should be hinged under the heaviest part of the car, preferably forward of the center of weight. It is evident that it should be very stiff, so that it will withstand the compression strains to which it is subjected. From the nature of things, any sprag will act suddenly and with considerable shock. It must therefore be of substantial construction if it is to be of any service.

A criticism which seems to apply to all types of sprags in use, is that the controlling device is crude. When occasions for its use arise, there is always a necessity for quick action on the part of the operator, and the means for bringing the sprag into action, should, therefore, be within easy reach and simple in operation.

If the sprag is held out of engagement by means of a cord, the end of this should be fitted with a ring which engages in some form of snap catch which when pressed will release the cord and bring the sprag into action. This catch should be placed so that the operator will not be required to reach over the steering wheel or down at the side of the seat in order to get at it, as is too often the case. If it is thus inconveniently located the driver is likely to lose control of his steering in reaching for it.

Injuries Resulting from Alleged Speeding Assault.

The suit of Chas. Clement, a farmer, against Milton C. Hastings, chauffeur, was tried in the Supreme Court at Ballston, N. Y., last month. Clement alleged that on July 11 he was driving at Saratoga Spring, when an automobile driven by Hastings came into collision with his team. He charged that the automobile was being driven at a reckless rate of speed at the time of the accident, while he was making lawful use of the highway, and asked that he be awarded damages for the injuries sustained as a result of the collision. In charging the jury, Judge Spencer said that if Hastings was driving his car at a rate of speed demonstrating reckless disregard of its proper use and was wantonly indifferent to the consequences that might happen to others, the act constituted a wilful assault on Clement and his property and entitled him to damages. The jury returned a verdict awarding the plaintiff damages in the sum of $600.

The report of the Interstate Commerce Commission shows that 3,787 passengers were killed and 51,343 injured in railway accidents in the United States during the year ending June 30, 1904.

It should be kept constantly in mind that in starting a gasoline engine the handle should be pulled up on the compression stroke. There is then less likelihood of injury to the arm or wrist in case of a "back kick."

The United States Carriage Co., of Lowell, Mass., have recently completed a four-cylinder gasoline touring car after designs by Hon. Butler Ames.

TOURING ROUTES

A Tour Over the Mountains of North Carolina.

By J. A. J.

Automobiling in the mountainous western section of North Carolina is still in its first stages of development, but has already caught hold with a grasp that can know no breaking. Northern people and Northern capital have been drawn to this section for years, and the prosperity of the population is reflected by their means of recreation and their habits, as things that cost money, such as the automobile, are a good barometer of the social and commercial conditions in any part of the country. The automobile is no longer a novelty in this region, and more autos may be seen about the busy streets of our city (Charlotte) of 40,000 inhabitants than in any other city south of Washington.

I have been a reader of the Horseless Age for some time, and have been greatly interested in "Lessons of the Road." I do not remember having seen anything from this section of the country, and perhaps an account of a little trip of 185 miles from Charlotte to Asheville, N. C., by way of Spartanburg, S. C., and across the famous Saluda Mountain, will be of interest to your readers.

A local agent having sold a new 10-h. p., single-cylinder tonneau car of popular make to a well-known dentist of the "Mountain City," the new owner decided to test it by taking the machine across the country, instead of shipping it. As the Doctor did not care to tackle the job alone, he engaged me to pilot the car to its new home for him. On November 25, at 9:30 A. M., we started out on the long, rough ride. After getting the car in readiness, filling oil cups, gasoline and water tanks, the start was made, the first nine miles being over a perfect macadam road. Then for three miles more to the Catawba River it was rough and hilly, and the last half mile the going was in deep sand. Arriving at the river, we were ferried across, and continued on to McAdensville, a distance of six miles, when another stretch of fine macadam road, seven miles in length, was struck. We made fast time over this stretch and hauled up at Gastonia, twenty-six miles from our starting point, in one hour and fifty minutes. Here the machine was looked over, for, as it was brand new, we did not want to take any chances. Everything was found to be in good condition, and the journey was resumed. The roads were exceedingly dusty, owing to a rather long dry spell, no rain having fallen for several weeks, and the car stirred up an immense cloud of dust which covered the only occupant of the tonneau, the doctor's daughter, with a thick coating of yellow clay.

After leaving Gastonia, the roads were only fair dirt roads, made exceedingly rough and dusty in places by having been scraped by a road scraper, loose dirt from the sides being piled up high in the middle.

We made fair time, considering the condition of the roads, and had no mishap whatever, stopping only once or twice to tighten the high-speed clutch, to see that the oil lamps were feeding all right, and that the engine was not overheating, until we reached the Pacolet River, about eighty-eight miles from our starting point. Here we encountered very deep, dry sand, and the wheels sank in and the car stalled. I could move the car only a few feet at a time, and then had to speed the engine up and make another try. But the chain had stretched a little and was a trifle too loose, and in throwing in the low gear with the engine speeded up, the chain snapped. A mule team happening along at this time, we "hooked on" and were towed through the sand. Having some spare chain links, we repaired the chain in about an hour and the journey was resumed. We reached Spartanburg, about nine miles further on, at 8 o'clock. After engaging rooms at the hotel, the machine was stored for the night in a back lot, and after getting some refreshments we retired for the night, intending to get an early start for Asheville on Monday morning.

We were up early, and after getting things in readiness for the run over the mountains, found that we were short of cylinder oil, having only about enough to carry us half or two-thirds the rest of the distance. We began looking for cylinder oil, and put in the time from about 8 A. M. till 1 P. M. trying to locate one of the few automobilists of the town, but were unsuccessful, and telephoned the garage in Asheville to ship us a half gallon to a station up the mountain, where we would meet it. We got away from Spartanburg about 1:30 P. M., intending to meet the train with the oil twenty-five miles out. The roads being in excellent condition, the twenty-five miles were covered in a little more than an hour, and as the train was not due for some time, we decided our oil would last across the mountains and carry us through to Hendersonville, which it did. There we found a printing office that used a gasoline engine and were able to get the necessary article for our engine.

The trip out from Spartanburg for thirty miles was over the best kind of dirt roads, and as they had had rain recently in that section, we did not suffer from dust. We encountered mountain roads at Tryon, and were informed by several people at that place that we could not cross with an automobile, as the roads were very bad and steep and that others passing that way with machines had shipped them over the mountain by rail. However, we had started to make the trip, and were determined to do it. We kept going up, higher and higher, looking for the terrible places that had been described to us, and while we found plenty of work and steep places, the really "terrible places" did not show up, except in three or four instances, and then for very short distances. They were bad all right, but we negotiated them with little trouble. We kept going, and at about 6:30 reached the first summit and started down again, intending to make Hendersonville and stop there for the night. After it became dark, the going was very slow, as we had no lamps except two oil side lamps, and they were inadequate. It is seven miles from the first summit to the "gap" of the second summit, and after traversing about half the distance, we drew up at a mountain house, secured rooms and supper and placed the machine in the barn for the night.

We were up with the sun on Tuesday morning, and the view from the portico of the mountain house was grand. The air was cool and bracing, and after partaking of fried chicken, hot biscuits and coffee, we got the car out of the barn. We found everything on it in good order, nothing needing attention except the brake rod, which had to be tightened a little, the continued use of the brake coming down the steep inclines having worn it some and I did not care to take any chances with the car without brakes in good working order. The engine started at the first turn of the crank, and after bidding the mountain folk goodbye, we were off. We soon reached Saluda, where a number of summer homes and one or two good-sized hotels are located, and took on one gallon of gasoline, all that could be had in the town.

Saluda is at the top of the railroad grade said to be one of the steepest in the country, and down the Saluda Mountain a few miles has been the scene of a number of wrecks of runaway trains. The railroad company has placed safety switches at intervals down this mountain, with a watchman at each one, and now in case a train gets from under the control of the crew, the switches are turned and the runaway sent up a steep incline. The railroad drops 735 feet in three miles.

From Saluda we had a hard climb for three or four miles to the second summit, and found some pretty stiff grades which in places looked almost like the roof of a house. It was about all the engine wanted to do to get over some of them, but the sturdy little car did not balk once.

We finally reached the second summit, passed through the gap and began the descent to Hendersonville. After getting down a mile or two, the roads were very good for dirt roads, and good time was made. As we neared the town, the roads became better, and finally we reached the macadam.

Hendersonville is quite a noted summer resort, many Northern tourists spending all or a part of the summer there, and there are a great many beautiful summer homes not only in the city but also on the mountain sides opposite, where one may see doz-

ens of large handsome homes surrounded by beautiful groves. Another thing that struck us was the number of hotels and beautiful houses all along the route from Tryon on the east side of Blue Ridge, to Asheville. Fishing is good in the many mountain streams, and Green River is said to furnish good sport with the rod. We noticed quite a number of partridges, young birds that could hardly fly, as we passed along. Pheasants are said to be quite plentiful all through this section. The scenery in places is grand, in fact, equal to anything that I have seen in the Rockies or the Cascades of the West. We were fortunate in meeting but few teams on the bad stretches of road, and those we did meet gave us little trouble. They were mostly mule teams of the mountaineers returning home from the different towns where they had taken loads of apples to the market. A very fine grade of apples is raised in these mountains, and the mountain folk find a ready market awaiting them.

At one narrow place in the road, just at dark, we were held up for half an hour on account of a wagon being broken down in the center of the road, and as there was not room to pass we had to wait as patiently as possible until repairs could be made and the wagon be backed down to a wider place in the road in order to get by.

It was certainly amusing to hear the remarks of the mountaineers as they crowded around the "red devil." The majority of them had never before seen an automobile, and the expression on their faces revealed their astonishment at meeting one of "them things" on the mountain roads. The questions would come fast and furious. They would get down on their hands and knees and look under to see what made it go. We answered their questions, explaining the operation to them as well as we could, and were treated very courteously by them. They would go to their springs and bring us fresh water to drink and offer us apples from their orchards.

Hendersonville was reached about 10 o'clock, and we spent about two hours there taking on oil and gasoline and the doctor paying a few calls to friends and relatives. The run from Hendersonville to Asheville was without incident, the roads being very good, and Biltmore, George Vanderbilt's model town on his beautiful estate of several thousand acres, was passed through over the finest of macadam road, and Asheville reached at 1 P. M. After dinner we had the car cleaned up and took a spin over the good macadam roads surrounding the city, and on returning from one of our little trips were held up by a policeman and summoned to appear in court the next morning for exceeding the speed limit. We were informed that the car had been running at a speed of not less than forty miles an hour, and as the limit was twelve, we would have to answer before his honor. In court the next morning the policeman swore that we were going not less than forty miles an hour, and the magistrate required a fine of $5 and the costs.

A Trip Through New York State.

By Howard M. Stone.

As I have read many pleasant accounts of pleasant trips written by contributors to your paper, I determined to send you a sketch of one which I recently took from my home in Rochester to my brother's home in Flatbush, Long Island.

On September 7 my family decided to visit New York on an excursion leaving Rochester on the 9th. I had long hoped for a chance to take the little 6½ horse power car over this route, but had previously had no opportunity.

SOLID TIRES USED.

When about ready to start, an obstacle appeared in the shape of a burst tire. The tires were all solid except one, and this gave out at the proper time. A new solid tire was attached and the driving wheels were covered with old pneumatics. These pneumatics were cut in a circle. The knife cutting the tire open from lug to lug and the lugs were also cut out. Then the tire was stretched over the solid tire and fastened with fine wires and the wires secured to the spokes. This makes an excellent covering and protection for the tire and is not at all out of the way in respect to looks. It is also cheap, as old tires can be bought at any garage for fifty cents.

The tires held perfectly, and, although solid, I had no broken springs or axles. At New York, the covers, quite badly worn, were removed, and the inner tires appeared like new.

THE START.

At 8:30 A. M. Friday, September 9, I started alone on my trip. The weather was cool and an overcoat was very comfortable. About 10 miles from home I encountered 2 or 3 miles of sand and hills, but on nearing Egypt, I was pleasantly surprised to find it change to a hard, level road. This sandy stretch had previously frightened the timid ones in my family from traveling eastward, but I found that once having crossed this, the road was good beyond my best expectations. Not counting poor stretches, off and on, perhaps aggregating 20 or 30 miles, the whole way from Rochester to New York was very good riding.

I followed what is called the direct road and took it easy all the way, it taking me the whole week to make the 400 odd miles.

About 20 miles from Rochester I unexpectedly ran across the house of a cousin and stopped for a short visit, and before leaving I took her and her little girl for a ride.

A little further on, the engine began to miss, and a thick, black smoke came from the exhaust. I took apart the carburetor and found the mixer was covered with dust, and that the air had been shut off from the engine.

Further on I failed to make inquiries, and did not turn at the proper place. I went about 12 miles out of the way; but the roads were good and I did not mind it much.

THROUGH MONTEZUMA SWAMPS.

I had a guide and map along, which were very useful on the trip; however, they were not infallible, and I was later informed that I would have found better roads if I had not followed the guide, but had gone around Montezuma Swamp via Spring Lake, instead of going through the swamp as I did on a narrow, stony road and over shaking bridges. I reached Weedsport at 6 P. M. and put up at Hotel Stevens, a very good hotel for a small town.

Saturday morning, at the hitching stables, they charged me the exorbitant price of 10 cents for storing my auto over night. There were good macadam roads to Syracuse, which I reached at 10 A. M. At the Franklin works there they were very obliging, but I was detained for an hour or more by their system of written orders before I could get any gasoline. At Syracuse I had a good dinner and rested. I left at noon and found an excellent road to Fayetteville. On this road were the only toll gates I met, except for bridges. There were two, charging 8 cents each. At Vernon, in front of a blacksmith shop, the

CHAIN SNAPPED.

The shop came in handy, with its vise and tools, and the chain was fixed in short order. Ten miles from Utica the brake broke, but I let that go and used the reverse for braking purposes. I left the car at Muncie & Miller's garage and stopped at St. James Hotel.

Sunday morning I went to church, and in the afternoon I rode five miles into the country, took out the spring seat for a couch and rested for three hours. Then rode five miles further to Herkimer, where I found accommodations for myself and car at Hotel Waverly.

In the morning I attempted in vain to get a cable for my brake, and finally had to content myself with some wire clothes-line. I put this on double and found it quite satisfactory, as it lasted until I reached my destination. At 10 A. M. I left Herkimer, and after passing over mostly good roads I reached Schenectady at 6 P. M. The Empire House stored my auto for me, while I put up at a nearby hotel.

A FINE TURNPIKE.

Most of the distance from Schenectady to Albany is over the beautiful Loudonville turnpike, and I reached Albany at 8 A. M. Owing to the macadamizing of the road

east of Albany there is a miserable stretch for eight miles. Then, on turning southward on the old post road, I had a fine, smooth road all the way to Poughkeepsie. Eight miles from Poughkeepsie the chain broke, but I found I could go along on the low speed. All went well until I reached a hill. When half way up the chain jumped and I was afraid to apply the clutch very hard, thinking the chain would snap. I waited there, half way up the hill, for several minutes, but no help came. Finally I backed down the hill, stopped the engine and walked back. Soon meeting two young farmers, I told them my trouble, and they said they would be glad to push up the hill for the sake of a ride on the level. In this way we reached Hyde Park, where my new-found friends found a bicycle repair shop, the proprietor of which, a steam auto owner, kindly worked for two hours after dark and succeeded in fixing the chain so well that it holds yet.

CAUGHT IN THE RAIN.

Wednesday morning it rained, and we did not start until noon. The roads were muddy, requiring a good deal of low speed work. There were many hills, on the tops of which it invariably rained. When we left after lunch at Wappinger Falls it was raining hard, but we started all the same. Four miles south of Peekskill, as the engine thumped badly, we stopped it to oil the crank pin, thinking the oil was not flowing freely enough, but the rain seemed to take advantage of the opportunity to come down in bucketfuls. We left the machine and made for the house nearby. It was now after dark. For fifteen minutes it came down fast, then there was a brief intermission, during which we cranked in vain; then it poured again. The house seemed deserted. The barn was locked, but a shed was open, so at the next intermission we pushed the car into the shed, took a trolley car to Peekskill and rode to my brother's house by train.

MOISTURE SPOILS POLISH.

That night the car was left uncleaned for the first time, and when my mother and I reached it at noon the next day we found that the polish had departed to a great extent. They told us that streams of water two feet deep had crossed the road the night before, and we believed it when we came to some of the washouts. We had gone but a mile or so when the engine thumped badly, and on looking at the water pump I found it was not revolving, the driving pinions having fallen out. This was fixed temporarily by wrapping a bolt with cloth and inserting it in the hole, and this lasted until we reached Flatbush. That night we arrived at my brother's house, somewhat tired, but with a due sense of appreciation of the good work of the little one-cylinder car which had labored *so tirelessly for our benefit.*

MAINTENANCE AND REPAIRS

[Suitable contributions to this department, accompanied by sketches, are solicited and will be well paid for.]

The Care of Chains.

In a high-grade automobile driving chain are to be found as nice fits as in any other part of the car, yet the chains are required to perform their functions under more adverse circumstances than any other part of automobile mechanism. Chains are exposed to the grinding action of mud and grit, and conditions are such that proper lubrication is a difficult matter. If a large amount of lubricant is applied, it serves only to collect dust and grit, and soon becomes a destructive agent rather than a preventative of wear. On the other hand, lack of lubrication is nearly as bad, for rusting may then set in, and the resulting wear would be nearly as great.

It is interesting to consider the effect of a small amount of wear on every wearing portion of a chain. In the ordinary block chain there are four wearing surfaces for each block and link, viz., two between the pin and block and two between the pin and link. If we assume that there is .01 inch of wear between each of these pairs of surfaces, in a chain of sixty links the total wear would amount to 1.2 inches, and the chain would consequently be just so much longer than when new. This lengthening due to wear is commonly known as "stretching."

To prevent wear as much as possible, chains should be frequently removed and cleaned thoroughly, by first placing them for a time in gasoline and then going over them carefully with a brush, until all traces of grit are removed. When perfectly clean, it is well to allow them to stand for an hour or so in melted tallow mixed with half its weight of graphite. Heat must be applied to the bath while the chains are in it, to prevent it from hardening, but care should be taken that it does not boil. Afterwards the chains should be removed and all surplus tallow wiped off with a cloth. This operation impregnates all the small bearings with a good lubricant which stays in place and prevents mud from working in between the wearing surfaces. Instead of making the tallow-graphite mixture himself, the motorist can buy such chain lubricants already compounded.

CHAIN REPAIRS ILLUSTRATED.

Cacitas Pass, Cal., February 24, 1904. Ten per cent. grade two miles long. Sixteen rivets to file. Delay, 4½ hours.

Another matter of importance in the care of chains is to keep them at the proper tension. Too great a tension not only increases wear between the various parts of the chain itself, and between the chain and sprockets, but also causes a greater loss in the transmission of power and greater wear in the sprocket bearings. A slack chain is, of course, more likely to climb the sprocket or to jump off under sudden shocks. The proper tension is that which will hold the chain in two straight lines between the tops and bottoms of the sprockets when idle, and not bring a greater strain upon the sprocket bearings than is necessary to accomplish this.

It should be kept in mind that as a chain wears, its "pitch" varies, and in time a tendency to "ride" the teeth of the sprocket wheels develops. This increase of "pitch" increases the amount of wear on the sprocket teeth, and, as a result, when replacement becomes necessary, a new chain will not fit perfectly, and it will be more difficult to make it run quietly. It will be necessary also to use it under greater tension to prevent its jumping off, and this in turn will result detrimentally as described above. It is expedient, therefore, to replace chains before they have seriously damaged the sprockets.

Another cause for unnecessary wear in chains, which is perhaps of less serious consequence than the others mentioned herein, is failure to keep the sprockets in proper alignment. In cars fitted with side driving chains this condition may arise through the shifting of the axle sidewise under the springs, or the unequal length of the distance rods. Care should be taken in adjusting the chains to see that these rods are taken up or let out equally, so that each pair of sprockets revolves in the same plane.

A set of substantial master links is essential if chains are to be handled with any degree of comfort. If there is sufficient clearance space, it is advisable to use the kind which is fitted with two bolts and nuts which are locked in place by cotter pins. The nuts can be loosened with a small wrench, and the parts are usually of sufficient size to make handling easy. Much time and energy has been wasted in the past in working with small, delicate master links, which are a heritage of the bicycle trade.

The subject of successful chain covers has been considered probably more in Eng-

land than in any other country, and one English builder is now equipping his cars with these devices. More attention must be given to this matter of covers if chains are to survive as a means of transmitting the driving power of automobiles. The chain drive is comparatively efficient when all parts are clean and well lubricated, but a large part of this efficiency is lost when they are bespattered with mud and grit, to say nothing of the accompanying wear and uncleanliness.

LESSONS of THE ROAD

Diary Notes of a User.

BY * * *

It is a pretty inconvenient and unsafe happening to be caught upon a hill without sufficient power, and with a brake which cannot be locked in position to hold the car. This had happened several times when the motor was not working perfectly, and the only manner in which the machine could be prevented from running down hill backward was to allow the engine to stall and to throw in the low gear, or to ask some one else to hold the brake. We generally blocked the rear wheels with stones, as an extra precaution. On one occasion, when the car was being held by the low gear, through carelessness the engine was cranked with the clutch in, and the machine started off, striking the unfortunate cranker upon the shin with the starting handle and removing considerable epidermis. But for his presence of mind in catching the clutch lever as it went by and throwing it out, a collision with another machine would have resulted.

BRAKE IS PROVIDED WITH LOCK.

This little lesson resulted in a determination to attach a ratchet to the brake, and as the brake pedal was located close to one sill of the machine, a steel plate having teeth milled in it was bolted to the wood. A detent was affixed to the brake pedal, with its engaging end drawn against the ratchet surface by a spring, and its other end located close to one side of the pedal. When the foot is applied so that it covers both the pedal and the releasing end of the detent, the latter is held away from the ratchet, but if the foot touches only the pedal, the spring holds the detent in the last notch to which the brake has been forced, while a touch of the foot on both levers immediately releases it. Such an arrangement may be applied to any brake pedal with little trouble or expense, and many old machines may be improved by such an addition.

INCREASING LIFE OF SPROCKETS.

The driving sprocket of this machine had become considerably worn through long usage, but the wear was naturally confined to the driving sides of the teeth. It was found that the sprocket could be reversed upon its shaft, in which event fresh, unworn surfaces would be presented to the chain. The sprocket not being central as to the length of its hub, this change threw the chain out of line, and in order to correct this defect, a sufficient portion of one side of the hub was cut off to secure chain alignment, and the space on the other side was filled with washers. As the steel of the sprocket was found to be quite soft, it was case-hardened in the usual manner by the use of ferrocyanide of potassium. In a great many cases, owners will find that they can secure additional life from their old sprockets by this practice.

STEERING JOINTS REFITTED.

After years of use, the steering gear of this machine had accumulated a large amount of backlash, so much, in fact, as to render the steering rather uncertain. It is surprising, however, how much play one can tolerate in a steering gear if one is constantly driving with it and becomes fully habituated to its peculiarities. A stranger attempting to drive with such a gear would be very much at a loss in trying to keep the road. As the joints of the steering linkage were not adjustable, but were simply pins passing through holes, there was nothing to do but to ream the holes and make new hardened pins, which eliminated most of the looseness.

In this machine the power of the engine is transmitted to the change speed gears by means of a steel gear on the engine crank shaft and a bronze gear on the first change speed shaft. These two gears are not encased, and thus do not run in oil; consequently, they wear somewhat rapidly and make considerable noise. No means of lubricating them is provided. It was found that the bronze gear, which was the most worn, could be reversed on the shaft and a perfectly fresh tooth outline thus presented to its mate. This change was effected, and the noise considerably reduced. Since all parts of a gasoline engine always run in the same direction, it is quite often possible to reverse gears and other parts, so as to obtain wear out of both sides of the different portions of the mechanism. This is practically true of transmission devices as well, and the thrifty owner may take occasional advantage of the fact.

LUBRICATING EXPOSED GEARS.

In order to make it easy to lubricate these two outside gears, a good sized compression grease cup was so mounted upon the car body as to be conveniently accessible, and a small tube was led from it, terminating just over the point of mesh of the two gears. An occasional turn upon this cup forces gear grease or very heavy cylinder oil upon the gear faces.

The primary wiring had become pretty thoroughly soaked with oil, and finally began to show signs of breaking down. It was entirely replaced with the best rubber covered conductor, and the wires were cabled by serving with tape, made oilproof with insulac and secured to the woodwork by means of leather straps fastened with brass screws and washers. Making the changes and modifications which have been enumerated covered a considerable period, during which the machine was constantly in commission and operated without accident. Some quite long and very enjoyable runs were made on Saturday afternoons and Sundays, when weather permitted.

WIRING FAULTS APPEAR AT STARTING.

On one of these pleasant Saturdays two of us started for a small country town about forty miles away. The machine worked perfectly, but we stopped at a village about thirty miles out to take in a little gasoline, as none could be had in the little town for which we were bound. When we attempted to start we could not get a spark in one of the cylinders, although both had been working perfectly up to the moment when we stopped. After taking out the plugs and doing a few other perfectly unnecessary things, we found that one of the wires which connect to the timer had broken off. Five minutes' work was sufficient to make a new connection, but we could not help remarking upon the peculiarity of electrical defects which so frequently cause the apparatus in which they exist to work properly until it is shut off for some time, after which there is a positive refusal to resume operations.

TO PREVENT BREAKING OF WIRES.

The wire contacts to the moving terminals of a timer are especially likely to be broken and to cause considerable annoyance, unless made with the greatest care. These wires are continually being moved as the spark position is changed, and the wire frays or breaks at the point of greatest bending. If the end of the stranded wire which is clamped into the timer connection is soldered for a short distance away from the binding screw and wound with small twine, beginning at a point near the end of the soldered portion and extending for an inch or so along the unsoldered part, with the winding quite heavy at the point where the soldering ends and gradually tapering off, the bending of the conductor will be distributed, and it will be less liable to break than otherwise. Solid or stranded wires, whether or not provided with metal terminals, are pretty sure ultimately to break, unless specially looked after.

OUTDOES THE COACH.

Kind friends had allowed us to infer that the rest of the way was so hilly as to be beyond the power of an auto, but the little engine merrily puffed up the hills.

much to the consternation of the inhabitants, and carried us to our destination in about a third of the time which is generally required by the stage, which is the only means of public conveyance in these remote parts.

Monday morning saw us starting back, much against our inclinations, and a very quick trip was made to the village where we had stopped on the outward journey. It beginning to rain heavily, any further progress by the road seemed inadvisable, and the writer took the train for home, while his friend agreed to take the machine back to the house where we had been stopping and to return a day or two later, when the trip would be completed.

CAM SHAFT GEAR BREAKS.

The next morning a most heartbroken letter was received, saying that the machine had broken down and been pushed into a barn about two miles from my friend's stopping place. The cast-iron gear on the secondary shaft which operates the exhaust valve of the right-hand cylinder had stripped four of its teeth, thus putting that cylinder entirely out of commission. The unfortunate chauffeur was immediately advised by mail to remove the gear and shaft and send it to town for repair, but his best endeavors to remove the broken part were without avail. The secondary shaft of an engine of this kind is very inaccessible, and it is not easy to determine how it is put together in the oily darkness of the crank case, but finally a machinist, who was sent to the scene, removed the shaft and the gear after taking the engine nearly to pieces. After performing this dissembling act, it was, of course, found that the shaft could have been removed in a much easier manner by taking off the cam, which was screwed on to a shoulder on the shaft instead of being cast upon it. In the attempts to drive out the shaft, the gear was completely smashed, but, of course, this did not matter, as it had to be removed. A new gear blank was made out of machine steel at the shop in the city, and it was just about to be taken to another shop to have it cut with fifty teeth, which was the number which my friend had assured me the broken gear had carried.

A BAD COUNT.

The writer has developed a large bump of caution, and a hesitation in taking anybody's word for things in the automobile line (especially as to the fulness of gasoline and water tanks), and it occurred to him as a safe but probably unnecessary precaution to count the teeth on the pieces of the broken gear, when he found, very much to his surprise, that the number was fifty-two instead of fifty. This mistake was thus corrected. My friend is an engineer of some reputation, and it is doubtful if he ever hears the last of his little error in counting. We keyed on the new gear, instead of simply driving it in, as was done with the original one, and it should be better than ever.

It requires a little skill and patience to set a secondary gear correctly, but the machinist, with our assistance, soon got it in correct mesh and smoothed up the teeth of the other gear of the pair, several of which had been mashed when the accident took place. Our run back to the city was without incident, and most pleasant in every respect. No cause was ever apparent for the stripping of this gear. There was nothing that could have caught in the teeth, and the shaft had not become loose and spoiled the mesh. The work is rather light upon a gear in this situation, but is concentrated upon a few of its teeth—those which are in mesh during the opening of the valve. Steel is none too good for these gears. In fact, cast iron ought not to figure in automobile construction except as the material for cylinders and pistons.

A BROKEN CRANK SHAFT.

A few days after the above related accident a friend of mine invited two other gentlemen and myself to go to the beach in his double cylinder touring car, but requested that I agree to do the driving on the return trip, as the distance was rather long. There was no objection to this, and we had a beautiful ride to the shore, the owner of the car driving and delighted with the operation of the machine, which was running with great power. After dinner and a little enjoyment of the "sad sea waves," we started with the writer proudly holding the levers. We had gone two or three miles, and were just settling down to enjoy a stretch of fine straight road, when there was a "grind" from under the footboard and the engine, and the car came to a standstill. A broken crank shaft seemed the most likely cause of the sudden stoppage, particularly as this accident is one which is by no means uncommon in the operation of cars of this make. We at once proceeded to investigate, but found that we could not get the starting crank in place to try the engine. This car has a very ingenious safety device which prevents the attachment of the starting handle unless the spark timing lever is in its "late" position, and we found that this lever could not be moved. By the use of a screw driver, the little rod which forms the safety lock was moved out of the way, and the crank attached. We found, upon trial, that the flywheel turned without moving the cranks of the engine, thus showing that the shaft had broken at or near the main bearing on the flywheel side. It must have broken nearly square across, as it could be turned without any difficulty by means of the crank. The break, however, had given the end of the shaft enough end thrust to bind the safety catch, which prevented the movement of the spark lever.

There was nothing to do but to call in the assistance of a hay motor and be towed to a nearby stable, and I hope that we kept our faces as cheerful as the circumstances could possibly admit of, as we were dragged to the barn at the rate of four miles per hour.

The feeling of having another man's machine break down when in one's care is an especially unpleasant one, no matter if the owner be perfectly kind and philosophical about the matter, as he was in this case.

Trade Literature Received.

American Construction Co., 255 Atlantic avenue, Boston, Mass.—Leaflet descriptive of Kempster's roller bearing shears and bushings.

Synnestvedt Machine Co., Pittsburg, Pa.—Bulletins Nos., 1, 2, 3 and 4—Pamphlets describing the various models of their electric vehicles.

Panhard & Levassor, 230 West 13th street, New York City—Catalogue of Panhard cars.

Pope Manufacturing Co., Hartford, Conn.—Folder regarding their motor bicycle tandem attachment.

Buckeye Motor Co., Columbus, Ohio—Leaflets describing their air and water cooled motors and sliding gear transmission.

Wayne Automobile Co., Detroit, Mich.—Catalogue of their 1905 touring cars.

Crumrine Cycle Co., Greenville, Ohio—Folder of their tonneau seats for runabout models.

Byrne, Kingston & Co., Kokomo, Ind.—Catalogue No. 11 of carburetors, ignition supplies and mufflers.

Bates Automobile Co., Lansing, Mich.—Folder of their carburetor.

Wm. Hjorth & Co., Jamestown, N. Y.—Leaflets describing their combination pliers, wrenches, etc.

Rochester Automatic Oiler and Supply Co., Rochester, N. Y.—Illustrated catalogue of automatic oilers and supply cans.

The Standard Tool Co., Cleveland, Ohio.—Leaflet calling attention to the Improved "Standard" Twist Drill Grinding Gauge, Scale and Chart. Folder regarding bit stock and wood brace drills.

C. T. Ham Mfg. Co., Rochester, N. Y.—Catalogue of Ham's auto cold-blast lamps.

A. L. Palmer, Erie, Pa.—Folder showing the Palmer detachable tire.

The Motor Car Co., Jackson, Mich.—Leaflet regarding their runabouts with water and air cooled motors.

American Lava Co., Chattanooga, Tenn.—Booklet entitled "Lava for Mechanical and Electrical Purposes."

Auto Tire Protector Co., 615 Wetherbee Bldg., Detroit, Mich.—Price list of non-slip tire protectors.

Loomis Autocar Co., Westfield, Mass.—Catalogue No. 9 of Loomis Automobile and marine specialties.

Memphis Motor Carriage Co., Memphis, Tenn.—Leaflet regarding their steam vehicles.

COMMUNICATIONS

Engine Spells Still Persist.

Editor HORSELESS AGE:

Referring to the description of my engine trouble which you so kindly published in your issue of Sept. 21, under "Engine Has Spells of Weakness," will say that I have investigated the inlet pipe from the carburetor through to the inlet valves, and have failed to find any indication of the passages having been stopped up. Have also followed up the suggestion of F. N. B. in your issue of Sept. 28, but find my exhaust valves work perfectly, and the compression is good at time of engine weakness. In your issue of Oct. 19, I note the suggestion of D. B. S. relative to my "engine spells" in which he speaks of a "small gauze strainer" in the carburetor. I wish to say to D. B. S. that I do not find any strainer in my carburetor, which is one of the Byrne, Kingston & Co. make, of Kokomo, Ind. I have had small wires through all the openings many times, and feel sure that there is not any strainer in my carburetor, and will thank D. B. S. if he will describe the location of the strainer to which he refers. Will also thank you or any of your readers for "further light" on this engine trouble, of which the description in your issue of Sept. 21 is correct. Have cleaned the carburetor thoroughly many times since that issue, and have gone over the entire system from the gasoline tank to the exhaust pipe, and I cannot find anything to indicate the cause of the trouble, the only symptom of which is the cessation of the "hissing noise" as before described, and the loss of power; and then after a time (sometimes it is very brief and at other times quite prolonged) the hissing noise returns and simultaneously the power also.

W. E.

Advantage of Having Spark and Throttle Separate.

Editor HORSELESS AGE:

I have a popular air cooled runabout in which the spark and throttle are combined. In several articles published in THE HORSELESS AGE I noticed that owners of the same car as mine have changed this arrangement by introducing another attachment for either spark or throttle. What advantage is there in having spark and throttle separate?

R. G. W.

[The arrangement on your car is such that as the throttle is opened the spark is simultaneously advanced. This is, of course, all right as long as you run on the level or on slight grades, because under such conditions opening the throttle causes the engine to speed up, and the spark should be advanced; but if you open the throttle when coming to a steep grade, your engine may not speed up, but, on the contrary, be pulled down in speed, and the spark would then be set too early to insure the smoothest possible running and the maximum power of the engine at that particular rate of revolutions. In other words, on steep hills the spark should be set later than it is on your case, with the throttle wide open; there would then be less tendency for the engine to knock, and you would be able to climb steeper grades on the high gear than now. It is not advisable for every operator, however, to make this change, as unless he pays close attention to the spark lever in driving, he may damage his motor. Driving with throttle wide open and spark set late is injurious to the motor, and to prevent the possibility of doing this the manufacturers interconnect the throttle and the spark timer.—ED.]

Mr. Damon on Automobile Progress.

Editor HORSELESS AGE:

Much has been said and written about the tremendous advances in automobile construction, yet the real test of a machine, whether modern or ancient in model, is the work it performs, and it seems that some of the older carriages will run better and longer than new machines, even though they are not equipped with the latest "improvements." Aside from the eradication of the more apparent weak points in machines, the actual improvements even on the 1905 models are few. To be sure, there are a good many things added, but their value is doubtful. Lubrication has always been a source of trouble, especially when gravity feed was relied upon, but one point in favor of that method is its simplicity. If the pipes are kept free, the oil will run. With the new machines there are complicated pumps and many pipes, making parts enough to puzzle an expert if anything does go wrong. There is less noise in the new carriages than in the older models, but this is not an essential point.

The principles of operation and control remain practically the same as in 1899. The rough edges have been smoothed off, but even a new automobile demands careful and expert treatment to keep it running. On that line there is little gained, although brainy mechanics have worked hard trying to build machines that would run almost automatically. Here is where the man who has been waiting for a "perfect machine" is disappointed. He finds that if he buys a high cost car he is practically forced to engage an engineer to care for it, because even American builders are following the trail of foreign construction, and that means a number of levers, pedals, etc., etc., that are apt to go wrong unless manipulated by a man who understands them thoroughly. It has been clearly demonstrated during the last two years that nearly every standard car can be kept in running order for daily use, provided it is properly looked after and handled with any sort of skill. Here is where an advance may be claimed, but it is quite likely that a part of the advance is in the intelligence of the men who care for the machines. If the same skill had been available three or four years ago, probably a good deal of the first annoyance connected with automobilism in this country would have been avoided. In 1900 it was impossible to find a mechanic who understood an automobile, and even the factory experts were a bit crude. I remember that my first gasolene automobile lacked compression after a few months' use, and a machinist worked several days tightening the valves and packing the air pump, which controlled the engine speed. A factory expert found the trouble, at a cost of $30. Now such a difficulty would be located instantly, and the repairs would be trifling.

My idea is that the builders feel compelled to make changes, or add improvements, and they are therefore often driven away from their original good plans for the sake of announcing a novelty. Instead of sticking to one model until it is perfected so far as it can be, the engineers are kept hunting for new notions. For instance, one firm, after building hundreds of chain-driven machines, will abruptly change to a shaft-driven one, or the reverse, and so on. In more than one instance it has been shown that the older machines were far better than the newest models of the same concern. That has been for the reason that the well-tried plans have been thrown aside and new ones substituted. Instead of perfecting the crudities of the the early models it appears as though some of the builders threw away their best work for the purpose of being able to advertise a different machine.

I have taken this view of the matter because I happen to be using a machine built in 1902—and that is ancient as the ark as automobiles go. I have run the old machine a good many miles, in all sorts of weather, and with 50 per cent. heavier loads than it was designed to carry, and it has moved along in good shape generally. Of course, it has had difficulties, such as broken crankshafts and broken axles. Yet I have found, after careful investigation, that those troubles came from neglect, and not because of any particular fault in the construction. After long experience, I have found how to keep the oil running, and now I do not break the shafts. It did not require any elaborate contrivance to accomplish this result. It was simply a question of keeping the oil tank and pipes clean—and that would be necessary with the finest automatic equipment.

This old machine is now on its third season, and it is in good condition. I recently took a ride of 225 miles in the ancient car, going with two 1904 machines, and I was able to keep right along with the others, and did not have any trouble to climb hills they took on high gears. Both of the other cars were in fine order, and they had larger engines than are in my car-

riage. The experience sort of convinced me that it was not so much that a car had the "1904" or "1905" stamp on it as the manner in which it was originally built and the care it received.

Examination of the 1905 models now on the market shows that the designers have expected them to be run by men who understand the work necessary. And I guess that is the main point. ROBIN DAMON.

Proper Angle for Steering Arms.

Editor HORSELESS AGE:

I am remodelling an automobile, and the change involves a reconstruction of the front axle entire. Will you please publish in your columns an untechnical formula for accurately determining the bend of the steering knuckles. I noted a technical paper on the subject in one of your earlier issues, but it went too deeply into sines and cosines to assist the layman. Perhaps you have already published the information desired, and which I have not on file; if so, you will confer a great favor by referring to such issue. "KNUCKLE."

[We presume what you wish to know is how to determine the proper angle for the steering arms of the knuckles. This can very readily be done graphically by laying out on paper the running gear of the car to scale, in other words, the front and rear axle the proper distance apart, and then connect the points representing the steering pivots to the center of the rear axle. These connecting lines give the proper inclination. If the arms extend backward from the front axle, they are, of course, turned inward; if forward, they are turned outward, or toward the wheel.—ED.]

Speeds and Speed Indicators.

Editor HORSELESS AGE:

I have been much interested in reading the articles on speeds by Mr. Draper in THE HORSELESS AGE of October 19. Mr. Draper's experience and resulting feeling of surprise coincide exactly with my own.

My touring car is rated by its makers as having a maximum speed of thirty miles an hour, though it quite easily exceeds that rate. A few months ago I equipped my car with a speedometer, and after the first trip with it I was tempted to throw it away; but, as with Mr. Draper,, accurate timing showed that it was correct.

Starting off on first speed, with the car hardly seeming to move at all, the speedometer shows six miles an hour—the maximum legal speed in some towns inhabited solely by imbeciles. Changing to second speed, and moving at apparently the speed of a horse walking, the speedometer shows 10, and can be worked up to 17. Getting into third speed, the speedometer starts off at 15, goes to 20 before the engine has settled down to its work, and then works up quickly to 25, which seems to be the normal gait of the car with the engine running lightly. From this point to 30, the speedometer travels more slowly, and beyond that the acceleration comes only with favorable conditions—36 being the record point on level ground.

While speedometers are advertised as serving the purpose of saving a man from an unjust charge of exceeding the speed limit, I have found that in almost all cases my speedometer would furnish the evidence required to convict. Where before I had the speedometer I would have with perfect good faith sworn that I was within 10 miles an hour, I now know that it is absolutely impossible to drive my car on third speed at as low a rate as 10 miles—excepting, of course, for a few rods at a time. Anything under 15 is difficult, and 12 is the very lowest that I can hold to under the most favoring conditions.

Some time ago I was running along one of the residence streets of Buffalo, when I overtook a horse and buggy. I checked down, and, receiving a good-natured grin from the driver of the horse, we jogged along for a mile with my front wheel lapping his rear one.

Thinking I had trailed the buggy long enough, I was about to pass it, when I looked at the speedometer and found that we were going at 18 miles an hour. Now, if any one had noticed the horse, it would have simply excited admiration; while I was exceeding the legal limit by 8 miles an hour.

I own a small runabout, capable of doing regularly 20 miles an hour. There are two physicians in this city who repeatedly overtake and pass me with their horses when I am pushing the runabout to its limit.

The trolley cars run through the streets of this city at over 30 miles an hour; and when driving my automobile at 35 miles, between here and Buffalo, the trolley cars pass me as if I was anchored.

In discussing the speed merits of automobiles vs. trolleys, the usual comment is "but the trolleys run on fixed tracks, and if one but keeps off the tracks he is in no possible danger."

Very true. But people do get killed by the trolleys. A man who is careful enough to keep off the tracks is also careful enough to look around before stepping in front of an automobile. This class of citizens have the faculty of taking care of themselves, and are slaughtered neither by cars nor automobiles.

But there is a class of people who never stop to look, and who will step backward in front of a car or of an automobile. The law should hold that injury to these people is the result of their own negligence.

But, again, when a man suddenly jumps in front of a trolley car, the only thing that can save him is the braking power of the car, while, if he gets in front of the automobile, there is in his favor equally efficient braking power *and* the ability of the automobile to turn from its course to avoid him.

The fixed tracks of a trolley car are a safeguard only to those people who keep out of danger instinctively, while they are a positive menace to the careless people who form the total of all victims of this class of accidents.

It would be almost foolish to go on and speak of the comparative chances of the man who has actually been struck—in the one case by something weighing one ton and having rounded rubber wheels, and in the other case by something weighing 20 tons and having sharply flanged wheels of steel.

Is the proof of the pudding in the eating? In this city there are at least twice as many automobiles in service as there are trolley cars, and for some glorious reason there has been no municipal interference with the free operation of automobiles.

There has never been a person injured in this city by an automobile; while the killing of people by the trolley cars on their "fixed tracks" has been so frequent that it has ceased to excite comment.

The town of Tonawanda, through which all Buffalo-Niagara Falls traffic must go, has passed an ordinance in compliance with the State law, limiting the speed of *all* users of the streets to 10 miles an hour. The sign at the southern limit of the town is over half a mile from any building of any kind.

When the signs were placed, I asked a driver of fast horses "How would you like to be arrested for driving a horse through Tonawanda at anything faster than a 6 minute gait?" He said: "Why, that would be an outrage; they can't do it." I explained the law, and he said: "Oh! they would never convict a horse driver in a thousand years." I think he was right.

F. W. HASKELL.

Another Remedy for W. E.'s Carburetor Trouble.

Editor HORSELESS AGE:

Perhaps it is rather late to prescribe any remedy for the weakness in W. E.'s engine, as described in your issue of September 21, but I have experienced the same trouble and am using the same kind of carburetor. I have frequently had my engine running along nicely and seemed to have abundance of power, when suddenly it would seem to lose power and would scarcely pull the car on a level road with the high speed clutch in. In my case, the trouble was due solely to the carburetor. The threaded stem which regulates the supply of gasoline soon wears enough to allow a little motion, and the slightest movement of the stem changes the mixtures. This may occur while running along the road, or even while the car is standing. I do not know how the throttle on W. E.'s car is operated, but a great many throttles are operated by foot pedal

and depend on a spring to close them. If such a one is used, the carburetor stem cannot fit the threads too closely, or the spring will not close it. Some throttles are connected to a hand lever on the steering post, and with such, a closely fitting stem can be used. There is a spring under the head of the stem to take up lost motion, but it only helps and does not overcome it entirely. Another feature about the carburetor is that a different adjustment is needed for varying conditions of the atmosphere. I have frequently adjusted one at noon, and got the very best out of it—engine would start with one pull of the crank and develop full power—and perhaps next morning the engine would not start without changing the gasoline adjustment. This is not the experience with just one, but dozens of the same carburetors. C. L. LAMPKIN.

"The Tire Bugbear"—Another View.

Editor HORSELESS AGE:

In a spirit of fairness, the writer, on behalf of himself and other users of pneumatic tires, desires to express exceptions to the editorial "The Tire Bugbear" in THE HORSELESS AGE of October 19.

It is true that tire troubles are many, and that therein lies, to a greater or less extent, in varying instances, a principal source of expense in the operation of an automobile. But is the difficulty to be eliminated by the use of solid or something in the nature of semi-solid tires? No answer to the inquiry can be safely entertained which does not consider the nature and purposes of the car on which the tires are used.

In the early days of automobile building, not only in America but in Europe, the tires used were of a solid or similar construction. Then the pneumatic tire of the single tube type was introduced. In various forms of manufacture and methods of application the pneumatic tire—the cushion of compressed air—has remained. The law of the survival of the fittest is as great a force in its own sphere as the natural law of gravity. The pneumatic tires eliminated more trouble than they created, else the period of their employment would have been brief indeed.

Slowly, but most certainly, and in greatly increased measure during the past season (the editorial in question to the contrary notwithstanding) the pneumatic type of tire has been strengthened and improved. Everyone having had large experience with latter-day tires as compared to those of one, two and three years ago, will concede this.

No one questions that the immunity from other ills that the pneumatic tires afforded caused them to contribute greatly, if not actually more than any other thing, to the upbuilding of the automobile industry. And in this connection is it literally true that the cushion of compressed air is less desirable, even though, perhaps, less imperatively necessary than last year or the year before or still longer ago? Conceding that the construction of cars has improved incalculably—and we glory in the fact—have American roads and the streets of the great majority of the towns and cities of the United States approached anywhere near the level that permits of reasonable or comfortable speed on solid or similar tires? And if they have—though we can only pray that they sometime may—the fact remains that even on the finest roads of Europe the pneumatic tires are used practically to the exclusion of all others, save only on commercial and similar vehicles.

Now, further, does the puncture of a pneumatic tire involve a greater hardship than the breaking of some part of the car's mechanism, not to mention the snapping of an axle, for instance? Is the possibility of a puncture or even a blow-out more disquieting to the peace and comfort of the tourist or business man than the possibility of an accident to the engine, steering gear, frame, axle, etc.?

As between pneumatic and other tires, the law of the survival of the fittest will ultimately answer these questions definitely and there are various users of cars who are helping to produce the final answer by their own experimenting. Within the writer's personal knowledge there are several owners of automobiles who have changed from the pneumatic to some tire without the compressed air cushion. A few have apparently been satisfied; more have changed to something else; some have changed back to pneumatics. The general run of success with other than the compressed air tires is, in short, no less varied than the different degrees of "luck" experienced by different users of pneumatics.

It is a common belief that the perfect tire has not yet made its appearance, but meanwhile, at least, the matter sums up very well in the inquiry of the melancholy Dane whether it were better to bear the ills we have or fly to those we know not of.

But meanwhile, too, it is indisputable that pneumatic automobile tires have been in the present season decidedly better than in the one before it. There is positive assurance, as well, that they will be very much better still in the year to come unless the most extraordinary efforts and crucial tests both by manufacturers of tires and cars indicate nothing. As heretofore, the tires will be principally of pneumatic construction, and it is very doubtful if the compressed air principle will not be embodied in the ultimately perfect tire.

Until that tire arrives, however, if users of automobiles will bestow upon their tires some part of the consideration they are bound to give their cars if they do away with the cushions of air under them, many will be surprised at the satisfactory results. Punctures cannot always be avoided, it is true, but with good tires well taken care of—and this means that they should be on rims which fit—there will be little else to fear until the wearing out of the tread makes re-covering necessary. But even punctures do not always occur. Never before this season have there been so many records of long tours and long periods of service without so much as a punctured tire. But as to this, luck is bound to be more or less of a factor. If this element can be done away with, well and good, but the law of the fittest surviving is self-enforcing and every innovation whether in tires or cars will have to reckon with it.

B.

Low-Priced Four Cylinder Cars.

Editor HORSELESS AGE:

The automobile public appears to await, with feelings of interested expectancy, definite announcements regarding the new $2,000 four cylinder cars which are semi-officially promised by certain of the manufacturers. One may be pardoned for wondering what these cars will be like and for asking the question, "How can they do it for the money?" It is to be presumed that these moderate priced, quadruple-cylinder cars will be attractive to a large class of possible buyers, primarily because they are *four cylinder cars*, and not because of the particular merits which they may be found to possess or the special technical advantages inherent in the four cylinder type, but rather because they will have as many cylinders as the high powered imported or domestic cars which have been the aristocracy of the automobile world during the few seasons past.

It is understood that these new four cylinder vehicles will be rated in the vicinity of 16-h. p. By no means all authorities are ready to assert that the four cylinder type offers as large a sum total of advantages for this output, as does the two cylinder opposed type of engine, which can easily be built to give the same power. To be sure, there is a slight theoretical advantage in the four cylinder construction in point of constancy of torque and freedom from vibration, but this is often considered to be more than offset by the increased complication due to the four cylinders. A quadruple cylinder motor has twice the number of valves, twice the number of spark plugs and double the number of reciprocating parts required by the opposed motor, and hence is likely to require at least double the attention and expense of upkeep as does the simpler engine. It is quite possible that in certain instances the additional care required by the four cylinder motor might demand the hiring of an engineer, while with the two cylinder construction the owner might find time to do the less amount of work which might be expected to be called for. As a general rule, the class of buyers to whom a $2,000 machine would specially appeal, are not people who could well hire a chauffeur and pay his salary and his hardly less serious incidental expenses.

Hardly any one doubts that for powers above 20-h. p. a three or four cylinder motor represents by far the best solution of the problem, but it is at least open to argument whether from the standpoint of the average user a four cylinder construction with an output of 16-h. p. does not sacrifice simplicity to an ideal which is based not upon technical fitness but which savors somewhat of foolishness.

These new four cylinder cars will, it is understood, sell at prices very little if any in excess of the figures charged for many two cylinder cars of about the same h. p., and it is by no means clear how the very nearly double labor cost of the quadruple cylinder motor can be kept down so as to show a profit, without some sacrifice in the quality of the workmanship, which might lead to unsatisfactory service. The intending purchaser will, of course, be given his choice between a considerable number of two and four cylinder machines of about the same price, and will be perfectly free to act upon his best judgment as to whether he will select a machine in which there is presumably an ample allowance of factory cost per cylinder or one in which the manufacturing cost allowed per cylinder may be inferred to be proportionally considerably less.

It should not be forgotten in this connection, that never before in the history of the industry have automobile factories been better equipped, more closely managed or turning out their product upon so large a scale as they are at present, and never before have the chances been so good of securing a satisfactory machine, even though it be of a somewhat complicated design, at a moderate figure. AUTOMOBILIST.

Tire Vulcanizing.

Editor HORSELESS AGE:

I have been much interested in the correspondence on repairs of small flaws in tires, and have tried myself with success the method consisting in applying rubber cement several times, letting it dry each time, and then putting on a patch. Now, I would like to ask whether some reader can tell me what temperature to apply in vulcanizing, and how long to leave it on? J. H. S.

Explosion Engine Query.

Editor HORSELESS AGE:

Will you suggest cause and remedy for the trouble I am having in starting my auto engine? It has always started promptly until last week. I was at the agency in New York to have a new valve cam put on. Since then it has been a 15 to 30 minute job to get the engine running more than 3 to 4 revolutions, and then only with the relief open; will stop every time it is closed. With cock in engine, head open, it will explode every time, but seems to lack power to get started; runs finely after it once gets going. It is fitted with the old vaporizer the Olds people used in 1901, so there is no carburetter to be at fault, and I manipulate everything to start as formerly. Batteries are new and plug clean, and the spark gap shows this part to be working properly. Since this has occurred only since the new cam was put on, it seems as if the fault was there, but I cannot catch on as to the how. The valves do not open and close exactly as the timing given in the directions for setting them, but as they put them on, I presume they are approximately correct. If you will help me out in this matter I shall appreciate the favor. FRED LOCKWOOD.

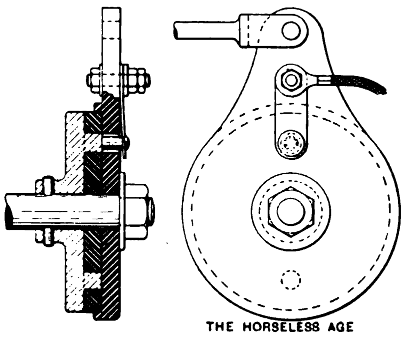
[Ordinarily when an engine explodes with the compression cock open and not with it closed, it is a sign that the battery is weak and will not force a spark across the gap between the sparking points under compression, but will do it when the compression is relieved. No other possible cause occurs to us at the moment. If you have an extra battery it might be well to connect both, and see whether the engine will then start up.—ED.]

Notes from a Repair Shop.

Editor HORSELESS AGE:

It very often happens in the repair business that by far the greater part of the work is taking the job apart and reassembling it, but few of the owners seem to realize this, and their kicks are numerous. I have known two hours to be spent (sometimes more) in drilling out a broken stud in some un-get-at-able place where a bolt should have been put in. The manufacturer is to blame for the designing, and the owner is equally to blame for being the owner, but the repairman usually gets blamed for both.

I recall a short time ago a doctor brought in a runabout for some small repairs, and while at work on the rig, he noticed a rear fender brace broken, so, thinking to have everything in good shape for him, I had a new end made of heavier and better material and put on, for which a charge of 75 cents was made. Well, the roar that man made would put a hyena to shame. He didn't want the brace mended, as he had a blacksmith who did his work, and would only charge him "two bits" for it. I told him if he felt bad about it I would donate



the brace, but he finally paid for it. He came in a few days later to use the power pump on a flat tire. I suggested to him that his tire ought to be repaired, but he said he had a bicycle man that did his tire repairing. Just at closing time the same day he came in again to pump up, but the big pump would not raise his tire. He asked me to lend him an inner tube till morning and he would return it. I had one put in and he returned it three weeks later. This same man would charge $2.50 for dispensing three cents' worth of quinine to a sick man without a shiver. Through it all we must look pleasant.

* * *

On page 348, issue October 5, I notice the query by E. Paul Du Pont, and judge by the sketch of the contact that his machine is a Ford. I can assure him that better results can be obtained by using two coils, as I know of a number of cases where it has been tried, and each time with good result. For a good contact that is easy to get at I would suggest having the contact points on the side of disc instead of on the rim, as the circular motion has a tendency to increase the length of contact as it wears, while on the side the contacts are always the same. In your sketch you show a contact device for single cylinder, while E. P. D. P.'s is double. I enclose a rough sketch of one made as I suggest, which works nicely, and can be taken apart by removing one cap screw. A disc of fibre is fitted to a bronze hub with two pins or lugs projecting through the fibre. The bronze hub is pinned to the shaft in place of the double cam. A pear-shaped piece of fibre is counterbored to fit over the disc to protect it from water, oil and dirt, and is fitted with a flat spring having a pin riveted on its lower end (of bronze or steel), which projects through the pear-shaped fibre to make contact with the projections on the bronze hub. A cap screw in the end of the secondary shaft holds the whole together. All surfaces are smooth. The wire is connected to the screw on top of the spring. As shown, it is for a single coil. For a double coil use two springs and one bronze lug. I have an interrupter of this kind that has been in use for four years, and never gives any trouble. The disc has been faced once, and one new end has been required on the spring in that time.

I am also using a mica core spark plug that has been used the same length of time. I wouldn't trade it for a carload of porcelain plugs for my own use. There is much difference of opinion regarding where best to locate the spark plug. Some say near the inlet valve, so the cool gas will strike it; others put it in some obscure corner where the explosive mixture has to go around Robin Hood's barn to get in the cylinder. I favor putting it as near the center of cylinder head as possible, and have had good results from this practice, as the plug seems to keep cleaner than when lower down, where oil can reach it more easily.

C. L. LAMPKIN.

New Vehicles and Parts

The New Packard Model "N."

The new Packard Model N for 1905 has been completed for some time and the factor has actually been engaged in its production since the beginning of October, but has purposely refrained from premature announcements regarding it. The new model is a light-weight, flexible, active touring car of 22-28 h. p. designed to meet the requirements of the modern user, be he enthusiastic tourist or in need of a family car.

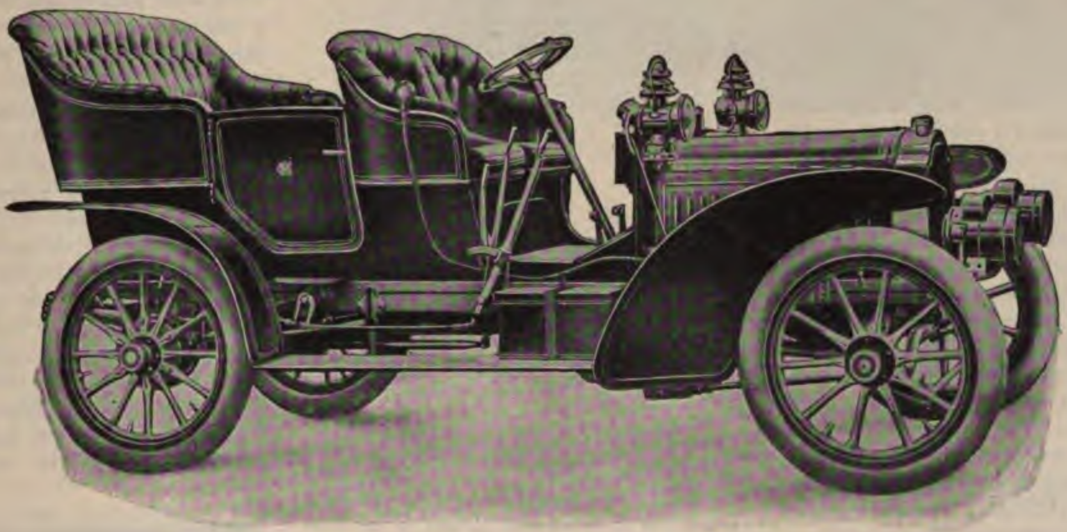
The wheel base is 106 inches with standard width tread. The wheels are of artillery type, 34 inches in diameter, with 12 spokes in the rear and 10 spokes in front, and 4-inch detachable tires. The front axle is of seamless steel tubing, 2 inches in diameter and ¼ inch wall. The steering knuckles are forged steel, brazed to the ends of the tubular axle. The steering centers are very long, and fitted with ball bearings. The steering crank is connected to the steering gear by a rod with ball and socket joints provided with spring cushions. The front wheels run on adjustable roller bearings. The front spring is of the Packard transverse type hung on shackles from the steering knuckles, thus bearing the weight at the extreme ends of the axle, and at the same time supporting the main frame in its center, the purpose being to decrease the racking and twisting of the frame. The rear springs are of semi-elliptic pattern, 49¼ inches long and 2 inches wide. The forging carrying the rear end of these springs also serves as a reinforcement to the rear corners of the frame. Two adjustable radius rods run from the front axle to the frame to hold the former in its normal position. The firmness with which the front axle is held in place is said to contribute materially to the ease and accuracy of the steering. Similar radius rods also run from the main frame to the rear axle. The main frame is entirely of pressed steel of channel section, the side and end bars being placed with their open side inward, and the intermediate cross bars with the open side downward. All of the riveted corners are braced with steel gusset plates. The side bars at the middle portion are 4¼ inches high and 1¾ inches wide, taper toward each end to produce a girder truss, and are curved inwardly to render the front end narrower than the rear. A large increase of width is given these side bars at the point of curvature, thus providing unusual strength at this point.

The engine is supported direct upon the main frame by 6 arms cast integral with the crank case and fitting into brackets of pressed steel riveted direct to the side rails of the main frame. The motor is of the standard Packard type with four cylinders placed longitudinally in front of the frame. It is rated at 28 h. p. at 900 r. p. m. The cylinders are cast in pairs, with the valve chambers and water jackets to each pair cast integral with them, the water jackets extending entirely around the valve chambers. The crank case consists of two aluminum castings, and is arranged to permit ready inspection and adjustment of the shaft and connecting rod bearings.

Both the exhaust and inlet valves are mechanically operated from the same cam shaft, and are all in one line along the left side of the motor. Inlet and exhaust valves are of the same size and interchangeable. The valve stem guides are particularly long, the valve heads thick and the valve seats wide. The valve cams and their roller, the cam shaft and the valve lifter rods are all hardened and ground. Bronze guides for the valve lifter rods are screwed into the crank case. A new method is provided for holding the cam rods in alignment, by means of forged steel arms in the ends of which the cam rolls are secured, while the further end is pivoted in the extreme opposite side of the crank case. The cam shaft turns in three bronze bearings, is entirely enclosed in the crank case and runs in oil.

The pistons have four rings, all at the upper end, and the middle portion is reduced in diameter to lessen the friction. The connecting rods are steel drop forgings and have large adjustable bronze bearings at each end. The ignition is by jump spark, the spark plugs being screwed into the caps over the inlet valves. The commutator is placed at the top of a vertical shaft driven by miter gears from the cam shaft. It comprises a cylindrical aluminum casing with fibre lining, in which four metal contact blocks are imbedded, these blocks being connected with terminals outside of the commutator casing. Extending from the top of the commutator shaft is an arm on the end of which is pivoted a roller, which presses against the inner wall of the case and establishes electrical communication as it passes over the various contact blocks. The primary current is supplied by a double battery and is utilized through a quadruple spark coil upon the dashboard.

The vaporizer is of an entirely new design, which was fully tested out in the 1,000 mile non-stop world's record-breaking run by the Packard car in August last. It is provided with a standard type of float chamber, and has but one jet of gasoline into the mixing chamber and no small delicate apertures. The mixing chamber is domelike in form, and is provided with water jackets in which hot water from the motor circulates. This results in heating the air and facilitates vaporization of the gasoline. The air inlet is at the side of the vaporizer, and is provided with a valve to control the mixture. An auxiliary automatic inlet is also provided which permits an ample air supply to meet the conditions arising from very sudden opening of the throttle or any similar action. The



PACKARD 1905 MODEL "N."

throttle is operated by a lever on top of the steering wheel, and is flexibly connected to the centrifugal governor situated upon the cam shaft. An accelerator is also provided which permits the instant opening of the throttle to any extent desired, and at the same time throws the governor out of action.

The lubrication of the motor is accomplished by means of a force-feed oil pump operated by a worm gear from the commutator shaft, the oil being carried into a reservoir under the hood, and passing through a sight feed glass upon the dash. The cooling system embodies a positive circulating radiator with cooling fan.

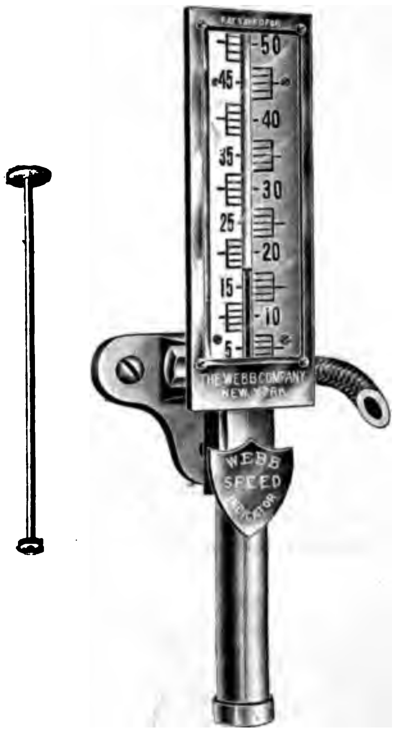
The power transmission is of the same design as on Model L, which the company claims to have found most efficient and satisfactory during the past year. The Packard transmission gearing forms an integral part of the axle, thereby combining all of these parts into one unit, and doing away with the independent transmission gear and its case. The drive is by bevel gear. The entire transmission gear, driving gear, and also the rear axle are mounted on double ball bearings, and the driving gear is also provided with ball thrust bearings. The transmission gear gives three speeds ahead and one reverse, being operated by two levers at the right of the car. The clutch is entirely self-contained and free from end thrust; it is of the expanding type and is operated by a pedal.

The brakes are duplex, and act direct upon the wheels. The regular brake is operated by a foot pedal and is of the band type, clamping on to a drum secured directly to the rear wheels. The emergency brake is of the expanding type and operates upon the inner surface of the same drums. It is actuated by a hand lever at the right of the car. The movement of the lever also automatically releases the clutch, whenever the emergency brake is thrown into action.

The most noticeable change from the well-known Model "L" Packard is the new double side entrance body. This body has large curves and luxurious form, as the reader may judge for himself from the illustrations. The rear seat has ample capacity for three persons and wide and conveniently placed doors, while the front seats are also very comfortable. The car is provided with continuous steps and large mud guards. In the matters of steering gear, control lever, and all similar features, the Model N preserves the familiar Packard lines. The finish of the body is in Richelieu blue and that of the running gear cream color.

The Webb Speed Indicator.

A novel speed indicator for automobiles is just being brought out by the Webb Co., of Park Row Bldg., New York City. The principle of the instrument is that an air *draft created by* a blower driven from the *front wheel of the car, lifts* a very light

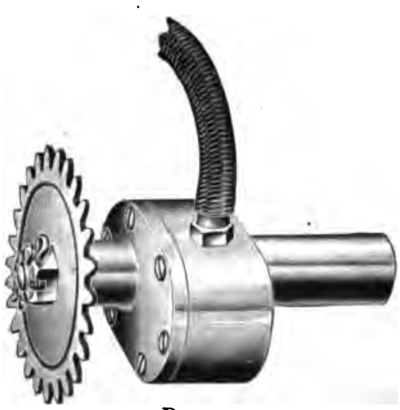


Webb Speed Indicator.

aluminum flyer arranged in a vertical tapering passage through which the air must pass—the height to which the flyer is lifted depending upon the velocity of the draft, and that in turn upon the speed at which the blower is driven by the front wheel. The aluminum flyer weighs less than six grains.

The blower is constructed on the same lines as the familiar "gear" pumps used as circulating pumps on some gasoline cars. The body of the blower is of close grained bronze. The two gears are the only moving parts, and the shaft which drives them runs in felt protected dust-proof bearings. These gears and their bearings are machined to micrometic accuracy. One gear forms an oil reservoir with oil for one thousand miles lubrication.

The drive is by steel pinion of coarse pitch, keyed onto the shaft and secured by a slotted nut and split pin. A large bronze gear with teeth varying in number

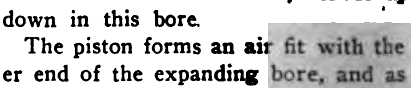


Blower.

according to the diameter of the road wheel, is affixed to the spokes by three lugs and screws. This gear is easy to adjust, as provision is made for truing up after setting it in position. The wheel gear is easily replaced by another when fitting to another auto with wheels of different diameter.

The blower is attached to the steering knuckle by stout bronze fittings varying somewhat with each type of knuckle. Connection is made with the dashboard by a tube of pure antimonial rubber, protected from grease, chafing and the possibility of collapse by a covering of varnished whipcord, made specially for this purpose. This may be cut to length by the user to allow the placing of the indicator in any position on the dash. Clips are provided to attach the tubing to the frame of the automobile.

The most notable feature of the indicator is the broad and open scale which is claimed to be distinctly readable at a distance of twenty feet, so that the indications can always be read from the rear seat of a touring car. The indicator is mounted on a tilting frame which may be adjusted to the proper angle for the eye. The upper part of the indicator carries the divided scale protected by a bevel glass front, behind which, in a glass tube, appears the index head of the aluminum flyer, colored a vivid red. The indicator is of heavy brass, and stout enough to prevent injury from any ordinary cause. The lower part of the indicator is bored out to a taper, smaller at the bottom and gradually enlarging toward the top, through



Section Through Taper Bore.

which tapering passage the air is drawn upward, passing out by the tube on the side. The flyer, consisting of a tiny seamless aluminum tube with an aluminum piston at one end and an index head of the same material at the other, moves up and down in this bore.

The piston forms an air fit with the lower end of the expanding bore, and as it is carried upward by the incoming air increasing vent is allowed around the piston as the bore grows larger, until equilibrium is established, when the opening is just sufficient to allow a current of air exactly proportionate to the speed of the machine. As the speed of the machine increases or decreases, the size of the opening and the height of the flyer vary correspondingly. The diameter of the flyer is exactly one-half inch; its weight is five and one-quarter grains. It is claimed for the instrument that it is of extreme accuracy, as its indications do not depend upon pivots, balanced parts, springs, etc.

Duryea Park Wagon.

One of the latest models of Duryea vehicles, the product of the Duryea Power Co., of Reading, Pa., is shown in the accompanying photograph. The propelling mechanism is of standard Duryea design, which has already been described in these columns, but the construction of the frame and body is a departure from the common practice of this concern. The wheels are of equal size, 30 inches in diameter, and the frame is carried on four semi-elliptical springs. The body provides seating accommodations for six or seven persons, all facing forward. The engine and transmission group are located under the operator's seat, but the space beneath the others may be used for storage purposes.

Motor Street Sweeper.

Motor Propelled Street Cleaning Wagon.

One of the most recent instances in which the motor has been "put to work" is seen in the street cleaning wagon here shown, which is the product of the International Sanitary Street Cleaning Company, of 143 Liberty street, New York City.

This wagon is designed to complete in one operation the task of street cleaning, which it would seem to accomplish, for it sprinkles, sweeps and collects the dust at the same time. A row of sprinklers is arranged just forward of the rotary brush, which is located at the rear of the vehicle, and can be seen in the photograph resting on the road surface. This brush sweeps the dust onto a traveling conveyor, which deposits it in a compartment provided for the purpose within the body of the vehicle.

The motive power is supplied by a Trebert 20-h. p., four cylinder vertical gasoline engine, set just forward of the front axle, and is delivered through a three speed gear box of the sliding gear type to a countershaft fitted with sprockets, and from these by chains to the rear wheels.

The driving wheels are forty inches in diameter, and are shod with steel ties four inches wide. Plain bearings are fitted throughout. Steering is effected by means of a "fifth wheel"—the front axle swinging on a king pin—which is operated by a large spur gear and pinion, controlled by a horizontal hand wheel of generous size beside the seat of the operator.

The brush and dust collecting mechanism are operated by chains, which run from a second set of sprockets on the rear hubs. The photograph shows very clearly the operating levers, brakes, the means of filling the water tank, and, at the side of the vehicle, the means of raising the brush from the street surface when not in use. The machine weighs about 5,000 pounds with tanks full, and is said to be capable of cleaning thirty miles of streets in ten hours.

New Duryea Park Wagon.

New Baush Universal Joint.

The Baush Machine Tool Company, of Springfield, Mass., are placing on the market a new universal joint for automobiles and motor boats, the invention of Frank E. Borcorselski. The joint is self-oiling, adjustable for wear and capable of centering into a true circle. The joints are claimed to have a transmitting capacity of from 5 to 50 horse power, and will work at angles up to 30 degrees.

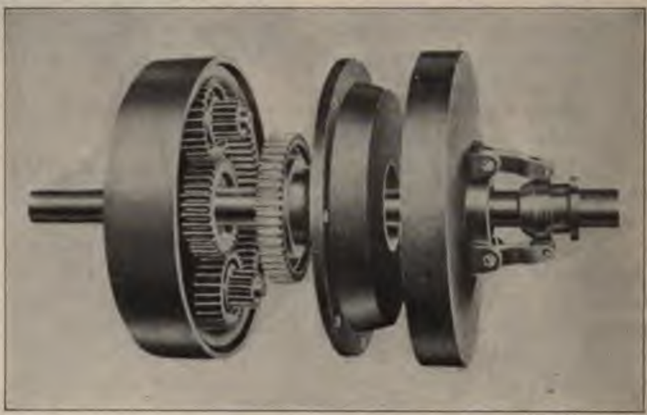
The joint comprises the usual forks, which have a tapped hole to receive a trunnion screw with a taper pin passing through it to keep the screw from turning in its fork section. The forks and trunnion screws are made of steel. The novel feature of the joint is the transmission spool or block of bronze, shown at the lower right hand corner in the cut. It is bored through from end to end of the projecting arms to receive the trunnion screw. This also leaves in the center of the transmission block an oil reservoir. The projecting ends of the transmission block are slotted, and felt is inserted to distribute the oil from the oil reservoir along the bearing on the trunnion screw and inner faces of the fork sections. There are two check nuts on each arm of the transmission block for adjusting the joint to a central position and tak-

Baush Universal Joint.

ing up the wear. All bearing surfaces are steel against bronze. A spanner wrench is furnished with each set of joints.

The Gale Change Speed Gear.

The cut herewith shows a two-speed and reverse planetary change speed gear recently placed on the market by the Western Tool Works of Chicago, and also used in their Gale runabout. The gear is claimed to be absolutely oil-tight, having no joints to leak; and to have three pinions less than any other of the same kind. The high-speed clutch is a cone clutch and the low-speed and reverse are obtained by applying malleable friction bands to the respective friction drums. Both the clutcn and the friction bands are of a new design which obviates the necessity of adjustment for wear. They are said to grip positively when applied, and not to drag when released. On the high gear the transmission is direct, and the whole gear revolves idle. The low gear gives a reduction of 2½ to 1 from the high gear, and the reverse 3 to 1. The gear weighs 65 pounds and the band 16 pounds, and the transmission capacity is claimed to be 10 h. p. The diameter of the friction drums is 10½ inches.



Gale Change Speed Gear.

Convertible Goods and Passenger Wagon.

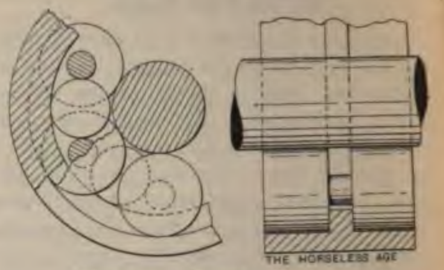
The "photos" herewith show the Knox Automobile Company combination business and pleasure car, which they have recently delivered to the Anheuser-Busch Brewing Company, St. Louis, Mo. This car has a carrying capacity of 2,500 pounds, or fourteen passengers. It is fitted with a double cylinder, opposed engine of five inches bore and seven inches stroke, and has a wheel base of 96 inches and standard tread. It runs on solid rubber tires, 32x3½ inches. The inside dimensions of the body back of the operator's seat are: Length, 96 inches; width, 45 inches. The wagon has a maximum speed of eighteen miles per hour. It is used for general utility service, filling rush orders, and for taking pleasure parties out to Mr. Busch's farm. The seats are readily removed, and the car is thereby converted from a pleasure vehicle into a business wagon.

Knox Combination Wagon.

Removable Seats of Knox Combination Wagon.

Kempster's Roller Bearings.

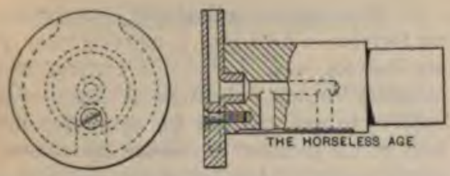
The American Construction Co., of 255 Atlantic avenue, Boston, manufacturers of the Kempster patent roller bearings, sheaves and bushings, are about to adapt these bearings to automobile use. The rollers of this bearing are turned with a circumferential groove midway of their length, to pass over or straddle an interior flange on the outer rolling surface. The rollers are held apart by means of rolling separators. The rollers and bushings are held in position within the sheave or bushing by a spring ring, which is easily removed and replaced when desired. By keeping a few rollers and separators in the tool box, when any of them become worn in use they can easily be replaced with new ones. It will be seen that the bearing has no cages, rivets and pivotal parts, and it is claimed that the friction is reduced to a minimum.



Kempster Roller Bearing.

Meisel's Combination Oil Cup.

The accompanying line cut shows a patented gravity oiler for lubricating parts which run on stationary studs and shafts.



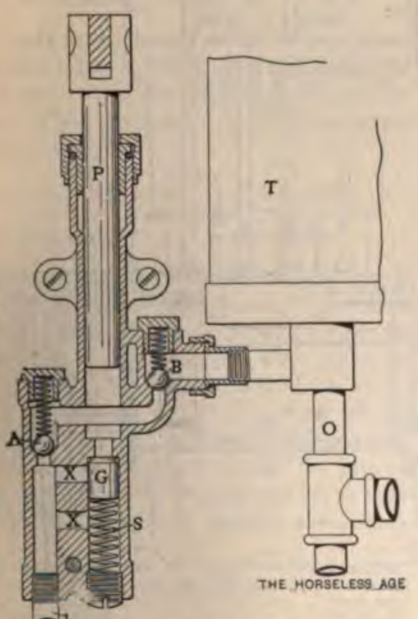
It acts not only as a lubricating device, but as a collar, washer and nut besides. It takes the place of the head on a stud and overcomes the necessity of using collars, washers, nuts or spring cotter pins, making a much simpler, neater and more efficient construction. The oil cup is a composition bronze casting, and is cored out to form an oil chamber. It is provided with a central projecting boss, which is threaded to fit into a thread cut in the end of the stud. The boss has a hole drilled through it to place the oil reservoir in communication with the oil passage in the stud. After the cup is screwed in place, which may be readily accomplished by inserting a piece of flat stock in the reservoir and using it as a lever, a screw is inserted to prevent it from turning or working off. On automobiles the cup might prove useful for lubricating the stud on which the cooling fan revolves.

The Improved Nash Fuel Pump.

Certain detail changes have been made in the construction of the fuel pumps for steam vehicles made by the Nash Pump Co., of Boston, Mass. The sectional drawing reproduced herewith, shows the new design. The pipe I connects with the source of supply. The plunger P is operated by a rocking lever which is secured at one end to one of the crossheads on the engine. As it moves upward the gasoline or kerosene is drawn into the pump cylinder through the ball check valve A and is forced by the downward stroke, through the check valve B into the tank T, from which it is led, by the pipe O, to the burner.

When the accumulated pressure in the small tank has reached a predetermined point, the resistance on the upper side of the valve B will have become greater than the pressure of the spring S against the the automatic valve G. This valve will then open, and the oil will be forced through the orifices X back to the supply tank. By regulating the tension of the spring S, the amount of pressure used to feed the oil over to the fire can be varied accordingly.

A valve is fitted to the top of the tank T (not shown) through which air may be pumped to secure sufficient pressure to start the fire, or, if desired, the operating lever may be disconnected from the crosshead by means of a spring catch, and the necessary pressure obtained by a few strokes of the pump by hand.



NASH FUEL PUMP.

The Ecco Three Point Switch.

A three point switch for use with ignition systems has been put upon the market recently by the Electric Contract Company, of 202 Centre street, New York City, under the trade name "Ecco." It is designed for use with a double battery equipment and enables the use of either set of cells alone or of both together in a multiple arrangement. Wires from the corresponding end terminals of the two batteries are led to the outside contact buttons, and the primary circuit is completed across the handle, or moving member, to a wire which runs from a binding post at its center pivot, to the coil. To change from one battery to the other, the handle is thrown over to the other outside button.

The multiple arrangement is obtained by moving the handle to the center button. It can be seen from the sectional view that this button is capable of a certain amount of movement, and is held in its normal position by the flat spring, which also forms an electrical contact between it and the button shown at the right in the sketch. The pressure of the handle when resting on it, forces the center button down until a contact is made between its end and a spring, connected electrically with the button on the left, and bent so that it will normally clear the end of the center button. As one terminal of each battery is "grounded" and the others are connected at the switch to a common wire, running to the coil, both will deliver current to the circuit. The handle is so made that it can be easily detached, and serves, therefore, as a safety lock, doing away with the necessity for a plug.

ECCO THREE-POINT SWITCH.

Palmer Detachable Tire.

We show herewith a sectional view of a detachable automobile tire, recently patented by H. A. Palmer, of Erie, Pa., in which the outer shoe is fastened mechanically to the rim of the wheel. The channel into which the shoe fits is built up of two metal pieces which are bolted on to the sides of the felloe. The protruding edges of these flare outwardly, and to them the edges of the tire shoe are secured by means of small flat headed bolts. A wire is run through each edge of the shoe between the layers of fabric, to prevent the retaining bolts from tearing out.

PALMER DETACHABLE TIRE.

In replacing an inner tube one of the metal side pieces is freed from the rim by removing the bolts which pass through it, and the tube is withdrawn through the opening so formed. The inventor claims for his tire that it will not creep when in a deflated condition, that rim cutting is impossible and that a tube can be replaced in a very short time.

A reader in Leamington, Ont., writes us that contrary to a statement which appeared in our columns some time ago, the rule of the road is the same in Canada as in the U. S.—everybody keeps to the right hand side.

OUR FOREIGN EXCHANGES

The New Buchet Motor.

The French motor manufacturing firm of Buchet, in Levallois-Perret, near Paris, gained something of a reputation at an early period in the development of automobile motors, as builders of extremely light and powerful motors, of which they have furnished quite a number for æronautical purposes. They are the inventors of the "culasse Buchet," a cylinder head into which the valves open directly from above. The great power which they obtained from their motors was ascribed to this valve arrangement, the short and direct inlet and outlet admitting of operating the motor at a very high speed.

Lately the Buchet firm has also brought out a motor with mechanically operated inlet and exhaust valves in a valve chamber at the side of the cylinders, but still retaining the old type with valves in the head, the latest form of which is herewith illustrated. It will be noticed that the cylinder head is cast separately and bolted to the cylinder casting, but each part has a separate jacket, and the two jackets are placed in communication by a short outside tube in the form of a V, as shown in the drawings. The waterspace in the heads entirely surrounds the valves, and in order to get room for large enough valves, the heads are bulged out beyond the cylinder wall at the sides. The valves are arranged in cages and can be removed as a whole. It will be noticed that the part of the stem near the head is very large in diameter to guard against the head of the valve breaking off and dropping into the cylinder. Besides, if the inlet valves should break, they would apparently be caught between an internal flange and the spark plug end, and could not drop on the piston. The valves are all mechanically operated, by means of rock levers or tappets, and long push rods extending up the side of the cylinders. The push rods move in guides at the side of the cylinders, which are not shown. The engine speed is controlled by varying the lift of the exhaust valve by means of mechanism associated with the cam gear which is normally held in the position of small lift and slow engine speed by a coiled spring, one end of which is secured to the crank case. The crankshaft has two outer and one intermediate bearings, all of the ring self-oiling type. The cam gears, cams and ignition contact maker are enclosed in separate chambers at the end of the crank box, and the gear circulating pump forms an integral part of the engine and is driven by gears direct.

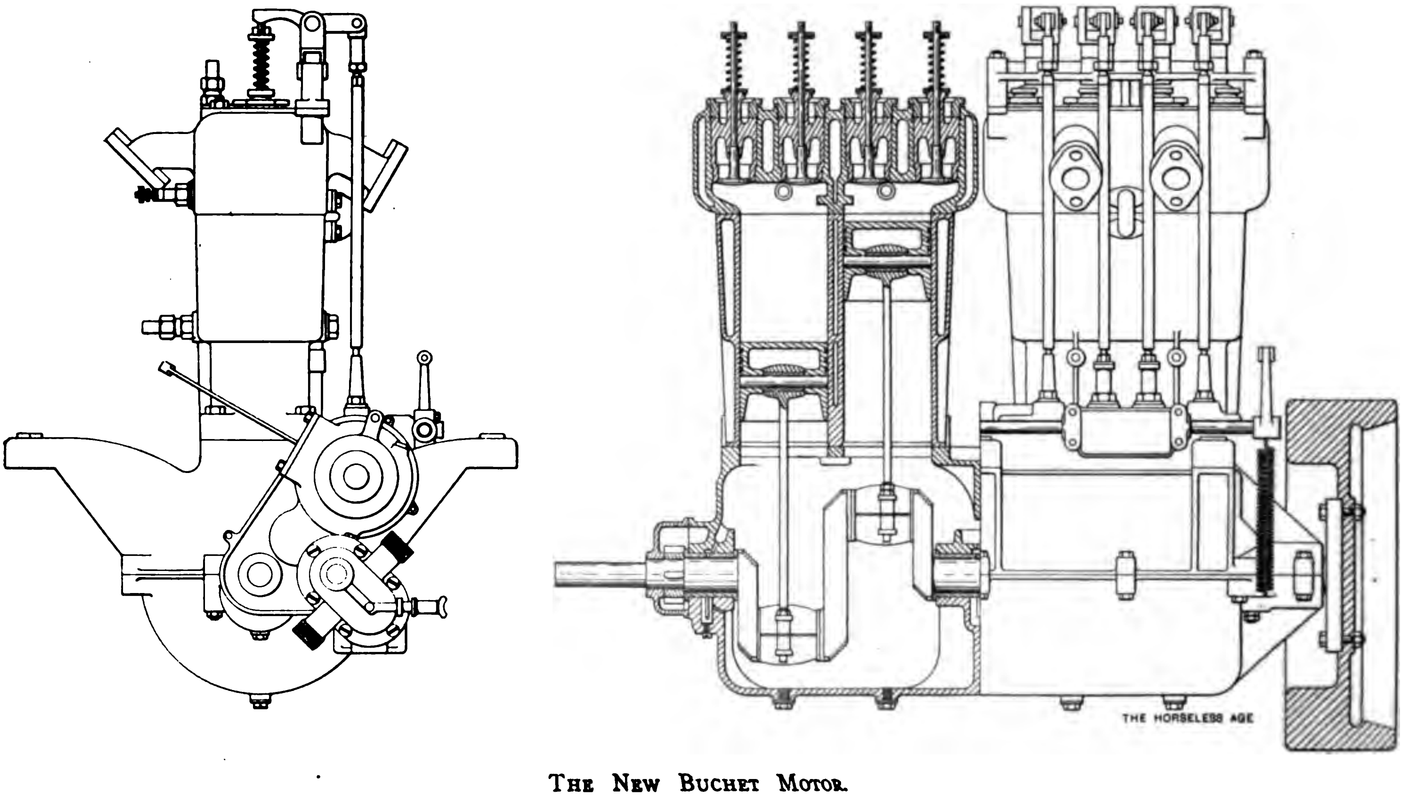
Lightness of construction is apparent throughout in the drawing, and it will be noticed that three longitudinal ribs are cast on the lower part of each cylinder to stiffen it. A characteristic of this type of motor is its unusual height. The motors are made in two sizes, 16 and 24 h. p., and also as two cylinder motors of half these powers. The speed of revolution varies from 1,000 to 1,200 turns per minute.

A Birmingham (England) magistrate on October 7 held that a morning coat is not correct wear for motor cycling, and William Whitely, of Brighton Road, was ordered to pay the costs for permitting the tails of his garment to obscure his identification number. Another motor cyclist was fined for carrying a parcel by which his number was partly obscured.

Prof. Van't Hoff, through the medium of the *Zeitschrift für Physikalische Chemie*, offers a prize of $300 for the best and most complete synopsis of the literature of catalytic phenomena. The last day for the receipt of papers in this competition is June 30, 1905; the papers must be addressed to the Editors of the *Zeitschrift*, 2, Linnéstrasse, Leipzig. The competition is to be decided by Profs. Van't Hoff, Arrhenius and Ostwald.

M. Charley, automobile agent in Paris, has been sentenced to three days in jail; not, however, for having started the "$10,000 motor boat race across the Atlantic" humbug, as one might be inclined to guess at a first flush, but for having carried a wrong number on his car.

The opening date of the coming annual automobile show in Turin, Italy, has recently been changed from January 6 to January 21, and the closing date has been decided upon as February 6. The show will be held under the patronage of the King of Italy in the Fine Art Salon in the Valentine Park.



THE NEW BUCHET MOTOR.

Side Slip in Motor Cars.

(Concluded.)

btain definite results, and to enable a path to be drawn—Fig. 2—some itions were necessary. The car is as if it had only one skidding wheel d in the plane of symmetry of the his car is supposed to be traveling a slope, its forward velocity and rate ing being so small that there is no e effect arising from inertia, while pe is supposed to be inclined just nt to keep the car in motion.*

ig. 2 the direction of greatest slope is X, the center of gravity being at the of the wheel base. The car being with the center of contact of its wheels at a point on the axis of X, emote from the origin in the figure, ving its axis inclined infinitesimally

wheels and the road is sufficient to ensure their true rolling action without skidding, but the *scale* of the curve, as determined by the distance of the cusp from the asymptote, will vary with the position of the center of gravity.

In this case of slow motion, maintained by a slope just sufficient to overcome friction, it is clearly seen that a straightforward progression with rear wheels locked is unstable, and requires only an infinitesimal disturbance to determine the collapse of the motion, in accordance with the paths shown in Fig. 2; the *stable* condition of motion in which the rear wheels are rolling and the front wheels locked being finally aproached asympotically.

In the more general case, where the car is in rapid straightforward motion, and the rear wheels are then suddenly locked, the equations of motion, though capable of solu-

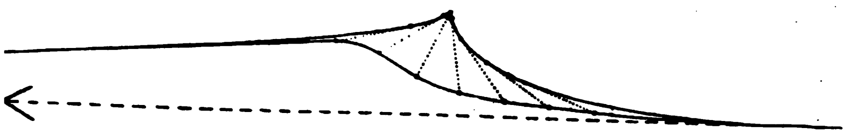


FIG. 3.

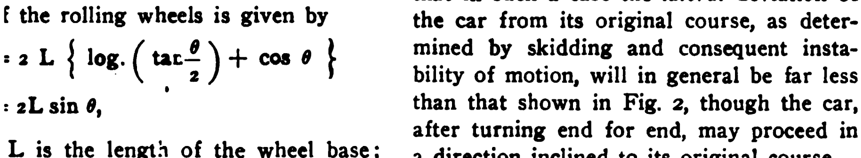


FIG. 4.

axis of X, with the rolling wheels in e of the skidding wheel, the paths de- by the rolling wheels and the skid- heel respectively are as figured. The f the rolling wheels is given by

$$= 2\,L \left\{ \log.\left(\tan\frac{\theta}{2} \right) + \cos\theta \right\}$$

$$= 2L \sin\theta,$$

L is the length of the wheel base; rameter θ being the inclination to is of X of the tangent to the path at While the path of the skidding wheel n by

$$= 2\,L \log.\left(\tan\frac{\theta}{2} \right) + 3\,L \cos\theta$$

$$= L \sin\theta$$

urves are symmetrical with respect to s of Y, while the former is a tractrix a cusp at 2 L, O; it will further be that each of the two paths is otic to the axis of X in both direc- The mean path of the rolling wheels recisely similar form (a tractrix) at er point in the length of the axis of the center of gravity may be, so long lateral friction between the rolling

tion so as to show the form of the path, can only be integrated in series. As regards the practical problem, it may suffice to remark that in such a case the *lateral* deviation of the car from its original course, as determined by skidding and consequent instability of motion, will in general be far less than that shown in Fig. 2, though the car, after turning end for end, may proceed in a direction inclined to its original course.

Figs. 3 and 4 show curves actually traced upon a sheet of paper by the little model car already referred to. The freely rolling wheels were tired with rubber, while the locked wheels were represented by a single lead pencil point, clamped at the other end of the car. The mean path of the rolling wheels was traced by a second pencil point placed half-way between the points of rolling contact with the paper, and carried by a piece of thin ribbon steel, so set that the pressure of this pencil point upon the paper was as light as possible, and had no appreciable influence on the motion. In each case the car was allowed to start from rest with the rolling wheels in front and to travel down an inclined board upon which the paper was laid. The direction of the initial motion was approximately along the line of greatest slope.

The curve traced by the pencil-point between the rolling wheels is in each case clearly distinguished by its cusp. Fig. 4 corresponds to the more rapid motion, the slope of the board having been somewhat steeper than was the case with Fig. 3. It is clear from Fig. 4 that the course into which the car tends to settle is inclined to the original course, owing to the angular momentum acquired by the car having swung it round through more than 180 degrees. In Fig. 3, which corresponds to a somewhat slower motion, the car has turned through less than 160 degrees, and the angular deviation of the final from the original course is in the opposite direction.

We learn from Mr. Campbell Swinton that he has observed a case of side-slip even more complete than those here considered. In this instance the car turned *completely* round, so that, after becoming reversed end for end, it still continued turning until it was once more facing in the direction of motion.

Since this paper was read S. F. Dufton has experimented with a model car, in which the hind whels were suddenly locked during rapid forward motion of the car, which was found to swing round in just the same manner as our model.

* are thus dealing virtually with a statical and the case is equivalent to that in he car is drawn slowly along a level sur- means of a rope attached at a point in the the car and pulled always parallel to a rection.

Annual Meeting of American Society of Mechanical Engineers.

Arrangements have been completed for the annual meeting of the American Society of Mechanical Engineers to be held in New York city, December 6th to 9th, inclusive. The first session will be held on Tuesday evening at the society's headquarters, 12 West Thirty-first street, when the annual address of the president will be delivered. Wednesday the business session will be held at the same place and on Thursday two sessions will be held at Mendelssohn Union at which a number of papers will be read. The reception and supper will take place at Sherry's on Thursday evening and the final meeting on Friday morning at the society's rooms. The nominating committee will present the following list of officers for the ensuing year: President, John R. Freeman; vice-presidents, S. M. Vanclain, H. H. Westinghouse, Fred W. Taylor; treasurer, W. H. Wiley; managers, G. M. Brill, F. J. Miller, R. H. Rice.

The Meisel Press and Manufacturing Company, of 944 Dorchester avenue, Boston, Mass., are now giving considerable attention to the manufacture of the various styles of gears used in automobile construction. Their transmission gears of the sliding type are made from steel forgings, case hardened, the teeth being beveled at the edges in the customary manner, to make engagement easier. They have a special process for cutting the square holes through sliding pinion sleeves, which is said to insure absolute uniformity.

LEGISLATIVE AND LEGAL.

A. C. A. Takes Up Grade Crossing Matters.

The frequency with which grade crossing accidents have occurred during the past few months has prompted the Automobile Club of America to take action with a view to remedying the evil. The Board of Governors has instructed the secretary to issue a letter to the general superintendents of all railroads operating in New York State, calling attention to the lack of proper signals at grade crossings. The letter follows:

"Many complaints have come to us from the drivers of automobiles in this State that very great laxity exists on the part of railroad locomotive engineers in failing to comply with the law regarding the ringing of a bell or blowing of a whistle on approaching a highway crossing at grade. It may be inferred that some of the serious accidents which have occurred at grade crossings recently were due to such laxity.

"In view of the many railroad crossings at grade which at present exist in the State of New York, we would respectfully request that you immediately call the attention of your superintendents and locomotive engine drivers to this complaint and to section 421 of the Penal Code, which defines such failure to comply with the law as a misdemeanor.

"Such action on your part will tend to prevent accidents and the possible prosecution of your locomotive engine drivers in accordance with the code."

A similar letter has also been sent to all railroads operating in the State of New Jersey.

New York, N. Y.—The Park Commissioners have placed signs at the entrances to Riverside Drive calling attention to the fact that the speed of automobiles is limited thereon to eight miles per hour.

New York City.—The occupants of a car which was speeding up Fifth avenue on October 30 threw ammonia into the face of Bicycle Policeman Debes who was pursuing them. He pulled up so sharply that a tire on his wheel burst and he was forced to give up the chase. The police have resolved to use extreme measures if the trick is repeated.

Bridgeport, Conn.—The board of tax assessors has made use of the state registration lists in assessing motor car owners for the value of their cars.

Litchfield, Conn.—A jury in the Superior Court has awarded James Donahue, of Torrington, $2,000 damages against Charles F. Farnham and Charles W. Lewis. The former's horse, which had been frightened by the latter's automobile, struck and knocked down the plaintiff and injured him.

Des Moines, Ia.—The Des Moines Automobile Co. have filed a petition in the district court asking that a contract whereby they agreed to trade $1,500 worth of stock to W. I. Franklin for the rights to a gasoline engine be declared null and void, as it is alleged that the motor failed to fulfill the claims made for it.

New York City.—Police Commissioner McAdoo has recently issued an order to the department calling for the enforcement of the law against reckless drivers of horses.

Salina, Kan.—The council has passed an ordinance limiting the speed of automobiles to ten miles an hour in the residential, and six miles in the business sections, with a four mile limit for crosswalks and corners.

Lincoln, Neb.—The new ordinance regulating the use of automobiles has become operative. Automobilists have been notified to register their cars.

Grand Rapids, Mich.—Dr. Perry Schurtz, president of the local automobile club, has pleaded guilty to the charge of exceeding the legal limit of speed and has paid the cost of prosecution. The second charge against him, that of running a car without identification initials, was dropped at the request of the prosecuting attorney, as it was evident that the doctor was out of the city at the time of the alleged infraction of the ordinance.

Camden, N. J.—As a result of the record-breaking trip to Atlantic City in an automobile by F. M. Pease, of Chicago, a petition signed by the residents of Elm has been presented to Prosecutor Lloyd asking that facilities be afforded for the arrest of automobilists who violate the law.

Wilmington, Del.—The rumor that the automobile ordinance which has been resting in a pigeonhole in the Council Chamber for some months had died, is denied. The Council Committee is still working on the bill and it is now proposed to frame a model ordinance and submit it at a conference between members of the Council and of the Delaware Automobile Association for approval before it is adopted.

Buffalo, N. Y.—Numerous complaints have been made to the police lately that automobiles which have been left standing in the streets have been stolen.

Chicago, Ill.—A suit to recover $20,000 damages has been brought in behalf of Fred Woodrich, a minor, who, it is alleged, was run down and severely hurt by an automobile operated by the defendant, William D. Schmidt.

Fifty owners of electric vehicles petitioned Judge Dunne, of the Circuit Court, to grant an injunction restraining the city from enforcing the automobile ordinance against them on the ground that it is impossible for their cars to exceed the speed limit. The judge denied the motion but granted an injunction restraining the Park Commissioners from enforcing their ordinance against electric machines.

Revised List of World's Fair Awards.

Considerable dissatisfaction was expressed by a number of exhibitors at the distribution of awards by the judges of the automobile department of the St. Louis Fair. A number of protests were made and the superior jury was therefore called upon to pass upon the list. Several changes were made by them, with the result that the lists which have been published so far are now incorrect. We give below a revised list of the awards to American manufacturers:

Grand Prizes to—Haynes-Apperson Co., George N. Pierce & Co., Pope Manufacturing Co., White Sewing Machine Co., Woods Motor Vehicle Co., Electric Vehicle Co., Packard Motor Car Co., Winton Motor Carriage Co., Miami Cycle and Manufacturing Co.

Gold Medals to—Olds Motor Works, E. R. Thomas Motor Co., Knox Automobile Co., National Motor Vehicle Co., Vehicle Equipment Co., Timken Roller Bearing Co., Veeder Manufacturing Co., Shelby Steel Tube Co., Goodyear Tire Co., Hendee Manufacturing Co., Pope Manufacturing Co., J. H. Williams & Co., Badger Brass Co., Eames Tricycle Co.

Silver Medals to—Cadillac Automobile Co., Ford Motor Co., H. H. Franklin Manufacturing Co., Grout Bros., McCord & Co., Northwestern Military Academy, St. Louis Motor Carriage Co., Sintz Gas Engine Co., Smith & Mabley, Gray & Davis, T. B. Jeffery & Co., Saks & Co.

Bronze Medals to—Duryea Power Co., E. C. Redick, Graham Co., Motsinger Device Co., Twentieth Century Manufacturing Co., Royal Motor Car Co., Waltham Manufacturing Co.

In the foreign section Grand Prizes were awarded to—Darracq & Co., De Dietrich, Michelin Tire Co., Renault Bros., Panhard & Levassor, La Metropole (bicycles), Georges Richard-Brasier Co., Benz & Co., German Daimler Co. (Mercedes), Continental Caoutchouc Co., Mors Co.

International Automobile Exhibition at Berlin.

An international automobile exposition will be held at Berlin, February 4-9, under the management of the German Automobile Club and the Association of German Motor Vehicle Manufacturers. The Landes Austellung Park which will be used for the purpose, provides 129,168 square feet of floor space all on one level. There will be five departments, viz.: motor vehicles for transporting persons, including those for sanitary, fire and military service; motor wagons for transporting freight; motor bicycles; motor boats; and parts and accessories.

According to the last report of the Department of Agriculture there are still 16,736,059 horses in the country, valued at $1,136,940,298, which information should be of service to the promoters of rendering companies.

Club Notes

NEW JERSEY A. & M. C. C.

The club held its first autumn run on Sunday, October 23, to Pompton, where the members met for lunch.

A. C. OF INDIANA.

The directors have sent a letter to Superintendent Keuger, of the Indianapolis police, assuring him of their co-operation in his efforts to suppress automobile scorching.

EASTERN A. C.

About thirty people took part in the club's recent run from Lewiston to New Meadows and the Topsham fair, Me., and back. A stop for lunch was made at the former place.

FAYETTE A. C.

The club was organized in Uniontown, Pa., recently and the following officers elected: O. W. Kennedy, president; J. Paul Johnson, secretary; Albert H. Hustead, treasurer.

MISSOURI AND KANSAS INTERSTATE A. A.

The new officers of the association are: President, Omar Abernathy, Leavenworth; vice-president, H. N. Straight, Kansas City; secretary, Ned Osborne, Topeka; treasurer, Dr. Beisel, Atchison.

MISSOURI AND KANSAS INTERSTATE A. A.

A meeting was held at Leavenworth on October 15 and 16, the Kansas City Club having made the run to that city in their cars. Sunday was spent in runs about the city and a visit to Fort Leavenworth.

ROCKFORD (ILL.) A. C.

A. E. Henry has offered a gold cup to the club, which is to be competed for by cars in touring condition carrying a full complement of passengers. The event will be a handicap and will be run off soon at the Driving Park.

DALLAS (TEX.) A. C.

A meeting was held on October 11th at which the committee on constitution reported that they had procured copies of the constitutions of several of the larger clubs and would draft an instrument based upon them. E. H. R. Green presented the club with a set of record books.

HOUSTON (TEX.) A. C.

A club run was made on the evening of October 20 by the way of the Richmond shell road to a point on the prairie eighteen miles from the city. Here a large bonfire was built and about it the party partook of a hot lunch. The return to the city was made during the last hours of the day.

A. C. OF SOUTHERN CALIFORNIA.

The board of governors recently adopted a resolution favoring the establishment of a board of public works, endorsing the proposed amendments to the City Charter of Los Angeles pertaining to the government and control of the streets, and condemning the present street superintendent, E. R. Werdin, for his failure to enforce the ordinance regulating the tearing up of streets.

SPRINGFIELD (MASS.) A. C.

It is likely that the club will co-operate with the local branch of the Y. M. C. A. in conducting an automobile school during the coming winter. Committees have been appointed by both bodies to confer in regard to the matter. The club has decided to conduct a series of lectures by representatives from the various automobile factories.

ALBANY (N. Y.) A. C.

A circular letter has been sent to motor car owners in Albany, Schenectady, Troy, Cohoes, Watervliet, Hudson and vicinity asking them to participate in the Hallowe'en carnival. Prizes of $50 and $25 have been offered for the best decorated cars. The committee in charge of the automobile parade consists of President Milbank, Joseph Taylor, Frank Fisk, Walter Leamly and Chauncey D. Hakes.

SPOKANE (WASH.) A. C.

A well attended meeting of motorists was held in the Spokane Hotel on the evening of October 19 at which steps were taken toward the organization of the club. F. O. Berg was elected temporary chairman and W. S. Dulmage temporary secretary. A committee consisting of W. S. Dulmage, A. A. Hosford and A. E. Gallagher was appointed to draft a constitution and by-laws.

PHYSICIANS' A. C. OF N. J.

It is proposed to invite prominent physician automobilists from all over the country to attend the annual meeting in January, in an effort to form a national organization. Drs. F. B. Meeker, J. S. Stage, E. W. Murray and H. M. Hart, the committee in charge of the meeting for November, have arranged for a number of addresses on subjects pertaining to the use and care of automobiles.

A. C. A.

The first of the regular winter season "club nights" will be held on November 15 instead of November 8 as previously announced, and on each Tuesday thereafter. Clubhouse privileges were extended to members at the Empire track during the race meet on October 29. A circular has been sent to club members calling attention to the recent order of the Park Commissioners restricting the speed of automobiles on Riverside Drive to eight miles per hour.

MARION (IND.) A. C.

Organization was effected at a meeting held in the rooms of the Commercial Club on October 11. Officers were elected as follows: President, J. L. McCulloch; vice-president, J. L. Barley; secretary, L. P. Hess; treasurer, O. E. Halderman. These officers, together with Dr. H. N. Swezey, George P. Campbell and Charles G. Barley, comprise a board of directors which will also be the legislative board of the club. The first run was held on October 16th, the destination being Wabash by the way of Peru.

A Match Race and More Records.

Leon Thery, with his Gordon Bennett Cup winning car, Paul Sartori, with a 90-h. p. F. I. A. T., Maurice Bernin, with a 60-h. p. Renault and Barney Oldfield, with the Peerless "Green Dragon," came together in a match race at ten miles at Empire City track, Yonkers, N Y., on October 29. The event was run off in three heats, two preliminaries and a final, with two cars in each heat.

In the first heat Sartori and Thery were competitors. The latter had a trifle the better of it at the start, but lost his advantage at the turn and was passed in the back stretch. Sartori increased his lead continually during the remainder of the heat and finished nearly a quarter of a mile ahead. His time was 9:45 4/5.

Oldfield made a runaway affair of the second heat and at the same time made a new record for five miles from a standing start, covering the distance in 4:41. His time for ten miles was 9:20.

In the finish, against Sartori, Oldfield had a stern chase for a time but finally passed his rival at the three-quarter pole and beat him by half a lap, finishing in 9:12 3/5, which is a new record for ten miles.

Between the heats of the match event record trials were made by several cars. Frank Kulick, driving the Ford racer, established new figures for light cars for from one to five miles. His accumulative times were: .59, 1:56 2/5, 2:53 1/5, 3:48 2/5, 4:43 3/5. His fastest mile was the fourth which was done in 55 1/5 seconds and is the record for the distance in the light car class.

Commercial Vehicle Notes.

The Electric Express Co., of Hartford, Conn., has purchased a Knox delivery wagon.

The Adams Express Co. has equipped its Washington, D. C., branch with automobile delivery wagons.

The Queens Borough (N. Y. City) Health Department is contemplating adopting automobile ambulances to convey persons suffering from contagious diseases to the department hospitals.

MINOR MENTION

The R. E. Hardy Co. have moved from Detroit to 255 West Broadway, New York city.

Automobilists of Steubenville, Toronto, Brilliant and Wellsburg, Ohio, are forming a club.

Percy F. Megargel has been appointed advertising manager of the E. R. Thomas Motor Co.

The Vaughn Machine Co., of Peabody, Mass., is experimenting with a gasoline-electric car.

Neill Wolfe, of 215 North Broad street, Philadelphia, Pa., has taken the agency for Marion cars.

F. A. Ward has sold his interest in the Duerr-Ward Co., of New York city, to his partner, C. A. Duerr.

The annual meeting of the Licensed Association of Automobile Manufacturers will be held on November 2.

W. K. Vanderbilt, Jr., has offered a trophy for a competition at 100 miles on the Ormond beach, in Florida.

The Michigan Automobile Co., of Kalamazoo, Mich., announce that they will increase their capital stock to $50,000.

The New York city office of the Packard Motor Car Co. will soon be moved into their new building on Long Acre Square.

La Verne Cole, of Rockford, Ill., has recently completed a gasoline touring car, which is to be known as the "Rockford."

The two Oldsmobiles which started some time ago on a 3,000-miles' tour of Great Britain, have successfully accomplished the task.

It is said that the Law Motor Car Corporation, recently organized in Hartford, Conn., will make a 4-cylinder car of about 20 h. p.

The Knox Automobile Co. write us that they have received an order for two touring cars from Jesus Aguayo, of Bolivia, South America.

According to a list compiled by W. D. Woolson, secretary of the Vermont Automobile Club, there are 215 cars owned in that State.

The first car of the Reo Car Co., of Lansing, Mich., has been tested on the road. It is said to be built on French lines, to have a motor of 16 h. p. and to weigh about 1,400 pounds.

There will be a meeting of the executive committee of the National Association of Automobile Manufacturers on Wednesday, November 2.

Harry A. Knox has resigned the vice-presidency of the Knox Automobile Co., of Springfield, Mass., and has disposed of his stock in the company. James H. Jones, recently with the Corbin Motor Vehicle Co., of New Britain, Conn., has been made head of the engineering department.

Alvan T. Fuller, the Boston agent for the Packard Motor Car Co., will soon occupy a new building, which is being erected on Stanhope street.

The Boston Y. M. C. A. automobile school will be opened on November 8 with addresses by Dr. Walter G. Chase, Parker H. Kemble and Elliott Lee.

The Memphis (Tenn.) Motor Carriage Co., recently incorporated, expect to manufacture a line of steam vehicles for both business and pleasure purposes.

The Palace Automobile Station, of Hartford, Conn., and H. A. Meeks, of Meriden, Conn., will act as agents for the E. R. Thomas Motor Co., during the coming year.

A pamphlet issued last week from the office of the Secretary of State of Connecticut shows that the number of cars registered in the State has increased from 1,875 to 2,406 since June last.

A meeting of the creditors of the Jones-Corbin Co., bankrupt, will be held at the office of Joseph Mellors referee, 528 Walnut street, Philadelphia, Pa., on November 9 at 3:15 P. M. for final distribution.

Automobiles and heavy vehicles are barred from the new speedway in the western part of Newark, N. J., and Irvington by an order of the speedway committee of the Essex county Board of Freeholders.

The Pope Manufacturing Co. expect to occupy their new garage and salesroom on Broadway between Fifty-fifth and Fifty-sixth streets on January 1. Elliott Mason and Robert E. Fulton will be in charge.

The stockholders of the De Loura Auto Manufacturing Co., of Fort Dodge, Ia., have voted to change the name of the concern to the Iowa Founders and Manufacturing Co. W. A. Kirkpatrick has been made manager.

The figures made by Earl Kiser and Charles Gorndt with Winton cars in record trials at Cleveland on October 19 have been declared official by the racing board of the A. A. A. They were from 15 to 50 miles, and were given in our last issue.

The Chemung Automobile Co., of Elmira, N. Y., are erecting a temporary garage at the corner of Baldwin and Church streets, which is to be displaced within a year by a three-story stone structure, plans of which are now being worked out.

Foreclosure proceedings have been begun against the Sandusky Automobile Co. by the Savings, Building and Loan Co., of Sandusky, Ohio. The amount involved is about $5,000 and is for loans of various sums made from July, 1903, to July, 1904.

The Wilson & Hayes Manufacturing Co. has recently been organized in Detroit for the purpose of manufacturing and selling automobiles. It is said that $20,000 of the capital stock has been paid in the property, etc., of the co-partnership concern bearing the same name.

As the result of an attempt to adjust the seat cushions while his car was running, Alfred Reeves, of Trenton, N. J., his wife and mother were seriously injured on October 30 near Bordentown, N. J. Mr. Reeves lost control of the steering and the car ran into a guard-rail and overturned.

Among the candidates who were recommended last week for membership in the A. C. of France were the following Americans: Maurice Sternbach and Henri Galli, of New York; Isaac Edward Emerson, of Baltimore; William Griffith Menshaw, of San Francisco, and A. L. Strasburger, of New York.

The Stolp Manufacturing Co., with offices at the corner of Huron and Townsend streets, Chicago, has been organized by by Frank W. Stolp, formerly with the Long Manufacturing Co., to manufacture "wire cooler tubing." The company expects to have its product ready for the market in about ten days.

The following have been selected as officers of the Diamond Rubber Co. for the coming year: F. A. Hardy, president; A. H. Marks, vice-president and general superintendent; W. B. Miller, secretary; A. H. Noah, treasurer. O. C. Barber, J. K. Robinson, and R C. Lake, with the officers mentioned, formed the board of directors.

The Massachusetts State Highway Commission has decided not to repair the road up Becket Mountain in Lenox. Automobilists who use the roads in that section will endeavor to do so by private subscription. It is estimated that the cost will be about $25,000. In its present condition the road is practically impassable for automobiles, owing to the clayey character of the surface.

The preliminary steps toward the organization of the New York Motor Club were taken at a meeting of some thirty enthusiasts at Bretton Hall, New York city, on October 28. S. A. Miles acted as chairman and L. R. Smith as secretary. It is proposed to make the dues nominal and not to restrict eligibility to the actual ownership of a car. A second meeting will be held on November 3 at the same place.

The car of the Duke of Connaught recently collided with an unlighted cart near Edinburgh and the duke was thrown out and severely injured. Of course, the car was traveling at a good clip and didn't carry much of a light either. The duke ought to be a good man to talk searchlights to after he gets over his injuries.

Danielson, Oct. 22.—**Palmer Jordan of this place bought a second-hand automobile in Providence, R. I., for a small sum and has rigged it up for sawing wood and it makes rapid work. He can saw a cord of wood in from 18 to 20 minutes and then jumps aboard and runs to the next customer.**—Hartford, Conn., ***Post.***

New Incorporations.

The Kensington Automobile Co., Camden, N. J.—Capital, $100,000. Incorporators: V. W. Lipes, D. G. Cameron, H. A. Tucker, E. C. Huselton.

Kendall Leather Tire Co., Portland, Me.—Capital, $500,000. Incorporators: W. G. Kendall, L. P. Larrabee

Elston Automobile Co., Indianapolis, Ind.—Capital, $10,000. Incorporators: S. W. Elston, I. O. Elston, E. C. Valon.

Wilson & Hayes Manufacturing Co., Detroit, Mich.—To manufacture and sell automobiles. Capital, $50,000. Incorporators: Thomas H. Wilson, H. Jay Hayes, Edwin A. Stevens, Jr.

Aquamobile Co., Oakland, Cal.—To deal in steam, gasoline and electric motors. Capital, $250,000. Incorporators: James D. McFarland and others.

Simplex Motor Car Co., Mishawaka, Ind.—Capital, $100,000. Incorporators: D. A. Shaw, R. E. Kamm, E. J. Gulick.

St. Louis Motor Service Co., St. Louis, Mo.—Capital, $2,000. Incorporators: W. H. Bradsley, C. E. Harris, A. G. Harding, E. L. Morgan, W. R. Morgan.

The Morse Motor Vehicle Co., Springfield, Mass.—President, Sewall Morse; treasurer, J. Frank Drake.

Smith Automobile Co., Topeka, Kan.—Capital $100,000. Incorporators: L. Anton Smith, Clement Smith, Levi L. Smith, Adele A. Smith, Terry Safford and Laura A. Strait.

Delaware Auto Storage and Repair Co., Wilmington, Del., to buy, sell and repair automobiles and other vehicles. Capital, $25,000.

Brighton Beach Automobile Club, Brooklyn, N. Y., to promote race meets. Capital, $2,000. Directors, W. A. Engeman, A. H. Battersby and C. H. Hyde.

Cleveland Automobile Dealers Company, Columbus, Ohio. Capital $1,000. Incorporators: Clifford B. Haskins, M. K. Eyre, George S. Waite, Clarence M. Brockway, L. M. Henders.

Lava.

Lava, the material well known through its universal use in gas tips, its wide application in the electrical arts, and also as an insulator for spark plugs, is not, as is frequently supposed, a natural product of volcanic origin, but is obtained from the mineral talc by baking it at a high temperature. The following description of the method of its production and its properties is taken from a booklet issued by the American Lava Co., of Chattanooga, Tenn.

Lava is produced from the mineral talc (H_2, Mg_3, Si_4, O_{12}), which is machined in its natural condition and then baked under certain conditions of time and temperature (about 2,000 degrees Fahrenheit or 1,100 degrees Centigrade) to a condition of such extreme hardness that when properly kilned it can scarcely be cut except by a diamond. After baking, the material is unaffected by any temperature short of that of baking, which admits of its use as an electric insulator in places where high temperatures have to be withstood. It fuses with difficulty under a strong blast flame. It is only slowly dissolved by hydrochloric acid and is not affected at all by other acids or by alkali. It is absolutely free from metal oxides or other impurities which would impair its insulating value. It neither swells nor shrinks with changes in atmospheric moisture, and its co-efficient of expansion with temperature being negligibly small, it is of especial value in instruments requiring a fixed relation of their parts under all conditions.

The material before baking is sawn, milled, drilled, turned and threaded with the same freedom as metals, such as brass, and by tools of the same character. For most work and for pieces of bulk, the method of baking is much the same as with porcelain, where coal and coke ovens are used, while with pieces of moderate size, and especially where close control of temperature is desired for the purpose of extreme accuracy and uniformity, the electric furnace or gas blast furnaces are employed.

Tests for dielectric strength have demonstrated that lava is remarkably uniform in its ability to withstand high potentials, not only momentarily, but when continued indefinitely, as its "dielectric hysteresis" and surface creepage loss cause no more heating under continued stress than in the case of porcelain under the same conditions. Its dielectric strength may be expressed as from 75 to 250 volts per thousandth of an inch thickness, depending, as in the case of all other electrical insulators, upon the absolute thickness of the sample tested The electric resistance is also very high.

Exports for September.

Automobiles and parts to the value of $123,487 were exported during September, 1904. The figures for the corresponding month in 1903 were $143,518 and for the nine months ending September, 1902, 1903 and 1904; $847,986, $1,192,829, and $1,445,-986 respectively.

Club Notes.

PHILADELPHIA A. C.

It has been decided to hold an endurance contest to Atlantic City early next spring. Horace A. Beale, Jr., has offered a cup to the winner of the event. The conditions will be similar to those under which the recent test through New Jersey was held.

DALLAS (TEX.) A. C.

Preparations are being made for the club runs to New Hope and Seagoville which will be held soon. A number of members have entered for the races at San Antonio.

PITTSBURG A. C.

Twenty-three club members took part in the fall run to Zelienople and return on October 29. The start was made from the clubhouse at 9:30 A. M., and with T. H. Hartley as pacemaker the cars proceeded to Perrysville avenue and the plank road, which was followed to the turning point. Here lunch was served, after which the return trip was made by the way of Wexford and the Three Degree road. The clubhouse was reached at about 4 o'clock. The distance covered was seventy-four miles.

Automobiles as Feeders to Railroads.

In a paper by Mr. Campiglio, appearing in the *Bulletin* of the International Railway Congress, the author cites the following specific instances of the use of automobiles as feeders to steam railroads:

A public service with five cars is in operation at Speyer in Germany. In 1900 these cars conveyed 100,000 passengers in making eight daily trips, out and return, on two of the lines, and four on another line which forms a continuation. The average daily runs of each car was 37.3 miles. The cars weigh 15,430 pounds each; they carry from 18 to 20 passengers seated inside, and eight standing on the rear platform. They have 10-h. p. 2-cylinder motors, and this is enough during the good seasons of the year. But owing to the bad state of the roads in winter, the management advises that in similar cases 12-h. p. to 14-h. p. motors should be employed. In winter it becomes difficult to keep the service going, as the resistance is much greater owing to the bad state of the roads, and it is then necessary to reduce the speed, or else the motors may fail to act. When there is snow, there is even more trouble, and it is necessary to fit special tires to the wheels. But if the snow is very deep and soft, these tires are no longer effective. This is a very rare case, however, and in the service in question has only happened once. Trouble has arisen in winter through the freezing of the cooling water, but this has been overcome by adding a certain proportion of glycerine to the water. This in its turn makes everything dirtier.

In this service, later on, open trailers weighing 3,300 pounds, were used in summer. The trailer had 20 seats, so that the motor car and trailer together could take about 50 passengers. The trailers were coupled by a sort of fork so arranged that the trailer followed in the same track as the motor car. In addition two safety chains were used. The trailers have solid rubber tires, which make them run very smoothly, and the public preferred the trailer to the motor cars. This service, which has now been running for over three years, is carried on regularly, and the management states that it is quite satisfied with its motor cars, with the reservation that if any new cars are required the power should be increased to 14-h. p. or 15-h. p., particularly if trailers are to be used.

A service of motor cars with Daimler gasoline motors was started last summer between Genoa and Torriglia, 21.7 miles, on a rising gradient. The distance was covered in two hours and a half up and in one and a half down. The car bodies were apparently subjected to too great loads, so that repairs became necessary. Another public service, of three Daimler cars with 18 seats each, was run between Cortina di Ampezzo and Toblak (Tyrol), over a distance of 19.3 miles. It was stopped because it did not pay.

A motor car service (gasoline motors) about which information is available is that of the *Société Anonyme des Messageries Francaises Automobiles* in Tunis. It has five Panhard cars, of 16-h. p., which can carry a load of 3,300 pounds (16 passengers and luggage) at an average speed of 13.7 miles per hour if the roads are in their ordinary condition. The back wheels of these cars have iron tires, the front ones solid rubber tires. The cost of maintenance has been estimated to amount to $4 per car per day, the car making a daily run of 62 miles. It is assumed that the cost of renewals, wheels, etc., up to the end of the year will certainly not average $10 per day, and it is estimated that the solid rubber tires will run 18,640 miles before they will have to be renewed. An experimental motor car service (Dietrich gasoline cars, with 12 seats) has also been organized between Luneville and Blamont (France).

A service of motor cars, with de Dion-Bouton steam motors, has been organized at Rouen by the *Compagnie des Messageries Automobiles.* There is a regular service of three omnibuses, two of 35-h. p. and one of 25-h. p. The cars have been running about a year with satisfactory results. There was occasional trouble in winter during times of rain and snow; nevertheless, though the runs amount to 25 miles and 31 miles, the cars were never more than about three-quarters of an hour late. The average speed is 7.5 miles per hour, whereas it should amount to from 10 to 11.2 miles per hour. Concerning the motors, the management recommends that great care should be paid to the boilers: "It is advisable to clean them out with steam every evening, to scrape out the spaces between the tubes every week, and to take out the tubes frequently." Another recommendation is to have a spare boiler to each two cars so as to make it possible to replace the boilers whenever necessary. It is estimated that 15 pounds or 16 pounds of coke are burned per mile run, and that 3½ pounds of grease, 3½ pounds of cylinder oil, and 4⅓ pounds of lubricating oil are consumed for every hundred miles run. The crew of each car consists of a skilled driver and a fireman.

In Italy a service of steam motor cars made by the same firm is run betwen Spoleto and Norcia, 31 miles, over a very undulating road, which is 1,050 feet above sea level at Spoleto, and then rises to a maximum of 2,400 feet, goes down to 1,093 feet, and then up again to 1,980 feet above sea level. The grades average from 5 to 6 per cent., and in some places are as high as 7½ per cent. The service was inaugurated October 20, 1902, with motor cars which could carry 22 passengers. The boiler is of the multitubular type, with a heating surface of 48.44 square feet, and the maximum pressure is 256 pounds per square inch. The power is transmitted through a jointed shaft and bevel gear to the back wheels, which have tires 4 5/16 inches wide. The car can carry a load of 6,600 pounds, and their maximum running speed is from 9 to 11 miles an hour, which is reduced in ordinary practice to 7 4/5 miles an hour, the cars making the run from Spoleto to Norcia in four hours, whereas horse vehicles took six hours.

The author considers that the motor car is not to be considered as a possible rival of the electric interurban line, but rather as a co-operator in its development. In cases where the electric road cannot be built because of the doubts as to its success, a motor car service can determine how much traffic there actually is, and develop it without heavy expense, since the motor car can be run elsewhere as soon as the electric road is built and takes care of the traffic previously developed.

As to the respective use of steam and gasoline motors, the author believes that the explosion engine is the most satisfactory. For the same number of passengers, the same speed and the same length of run, without requiring fresh supplies, the gasoline cars are lighter than the steam cars, and by a small increase of weight their speed can be materially increased, while the steam motor requires a much more considerable increase in the deadweight and in the supply of fuel and of water. It may be asserted that steam motors have been improved nearly up to their possible limit, and that owing to their unavoidably great weight and the cost of the material of which they are made, there is no reasonable hope that their cost can be materially reduced. On the other hand, explosion motors are still in an initial stage, and a considerable reduction in their mechanism may certainly be expected from the simplification of manufacture due to the intense competition which prevails.

In gasoline motors there is another advantage which has to be taken into account, and that is that they can always be started at once, whereas a steam motor requires about three-quarters of an hour before a sufficient head of steam can be accumulated to start. If at any time in public service it is necessary to start a reserve car owing to a sudden rush of traffic or to replace a broken-down car, this can be done much more quickly with an explosion motor than with a steam motor.—*Mechanical Engineer.*

A system of gasoline automobile busses has been installed between the Pennsylvania Railroad station at Fifty-second street, Philadelphia, and Merionville. The cars are lighted by electricity and are heated by the water used for cooling the motors. The line benefits the residents of Overbrook, Narberth, Merionville, Wynnefield and other suburbs, who have heretofore been forced to walk for eight or ten minutes after arriving at the railroad station.

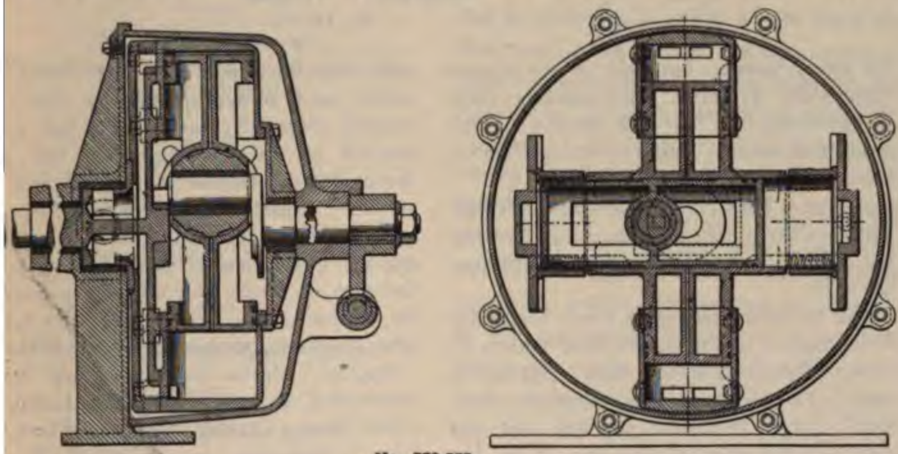
The Public Library Board of Chicago has voted to spend $2,500 for the purchase of an automobile for the book delivery service.

MOTOR VEHICLE PATENTS.

United States Patents.

72,353. Multiple Cylinder Expansion id Engine.—James T. Halsey. October 1904. Filed February 13, 1900.

'he leading feature of the construction isists in the combination, with the main ft, of a series of cylinders revolving h the shaft and each provided with a t arranged to register alternately with admission and exhaust connections and elatively fixed pin eccentric to the shaft l to which the pistons working in the inder are coupled. The eccentric-pin is vided with the means for adjusting it



No. 772,353.

as to reverse the engine or to regulate : cut-off of the expansible fluid admitted the cylinders, and the ports leading from : cylinders are preferably connected with : ports formed in a rotating plug con-ntric with the shaft, said ports opening in : sides of the plug and registering with : steam admission and exhaust conduits ening through the bearings of the plug.

772,410. Boiler Feeding Mechanism.—lwin F. Field, of Lewiston, Me. October . 1904. Filed October 20, 1903.

This invention relates to an improved iler-feeding mechanism for motor-vehi-s, the object being to provide mechanism r giving to the boiler a large immediate ter-supply, feeding automatically cold ter at the bottom of the boiler to replace

No. 772,410.

water vaporized, and prevent the necessity of the constant watching of the water-level in the boiler.

An upright tubular boiler is partly surrounded with the water supply tank, as usual in steam carriage construction. At the side of the boiler are arranged two "feed" tanks. These feed tanks are in communication with the boiler at top and bottom, valves being provided in both pairs of connecting pipes to shut off the communication. A pump is provided for forcing water from reservoir into the feed tanks, and funnel-shaped inlet-ports are located on the top of the feed tanks, and are normally closed by valves.

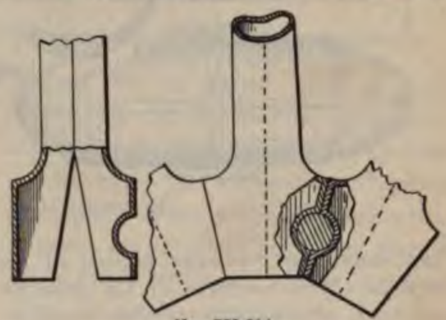
The operation is as follows: The feed tanks and boiler are filled to the desired level either by means of the pump or or through the funnel-shaped inlet-ports, and the water will find a common level in the tanks and boiler. As the boiler is heated, the steam will pass into the feed tanks, maintaining a uniform pressure in the tanks and boiler, and owing to the well-known fact that hot water always rises the cold water from the feed tanks will feed into the bottom of the boiler to replace the losses by evaporation, and always maintain a uniform level in the boiler and tanks, and owing to the downward coil or twist in the communicating pipes there can be no return from the boiler to the feed tanks due to the principle above mentioned. It will thus be seen that the boiler is provided with a large immediate supply automatically feeding to the boiler and insuring a long run of the engine without attention. If from any reason the pump should fail to work, all communication between the boiler and the feed tanks is shut off, by closing the valves, the valves at the inlet ports on top of the feed tanks are opened and water is poured into the feed tanks through these ports.

772,392. Means for Regulating the Production of Steam.—Henry S. Baldwin, of Lynn, Mass. October 18, 1904. Filed December 5, 1902.

In a flash boiler car the stroke of the pumps is varied by means of a special mechanism. An actuator for the pumps is reciprocated with a constant length of stroke by the engine and at a speed corresponding to that of the latter. The actuator reciprocates in a guide which is provided with a hand lever by means of which the guide can be adjusted so as to cause the actuator to impart a movement to a rocker of a greater or less magnitude, as may be desired.

772,814. Metallic Wheel Spoke.—Thomas Midgley, of Columbus, O. October 18, 1904. Filed August 24, 1903.

In the former type of Midgley steel tube wheel, each spoke is secured in the hub of

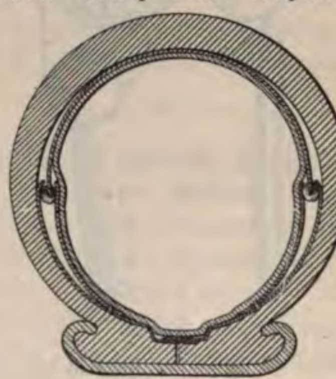


No. 772,814.

a wheel by a bolt which passes through the spoke, a transverse reinforce being used in the head of th- spoke to stiffen it, and a thimble inserted in the hub-plates and passed through the opening in the reinforce in each spoke. In the present construction the metal is bent in on one side of the spoke-head to form a transverse semi-cylindrical seat for a bolt, and each two adjacent spokes arranged in pairs in the wheel are secured in the hub by one bolt, and the metal which has been forced down in the side of the spoke-head forms a reinforce for the spoke.

773,216. Pneumatic Tire.—Madeleine Merli Mills, of New York, N. Y. October 25, 1904. Filed February 9, 1904.

Instead of fitting the inner tube directly into the cover a protector of novel construction is interposed between the case and tube. This protector comprises two



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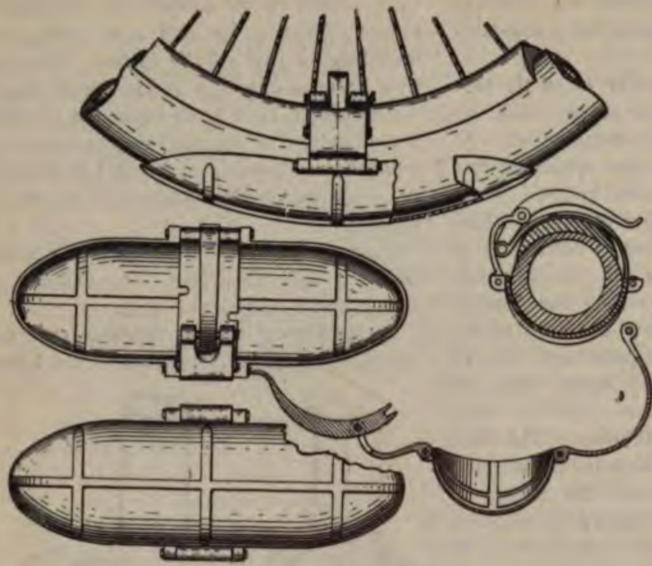
members, the inner one of which is stationary, while the outer one is movable (locally) toward and from the rim, allowing for a temporary compression of the air-tube. The outer member is a semi-circular ring, extending around the rim



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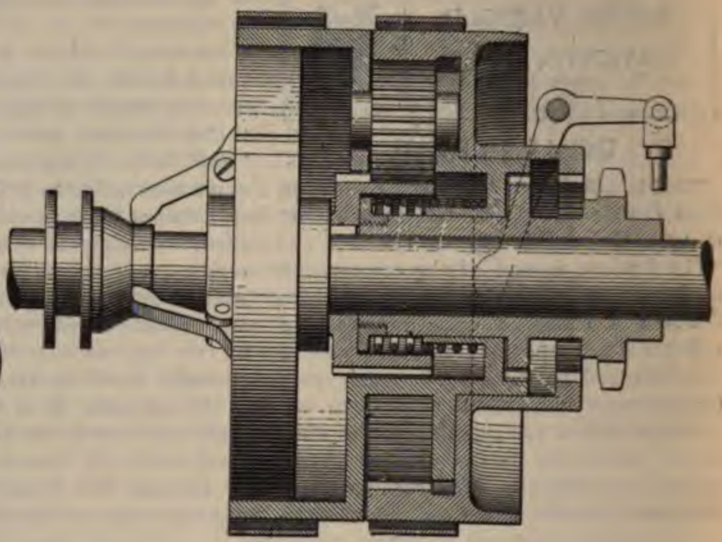

No. 773,142.

and embracing the outer portion of the air-tube. Both members of the protector are made of a suitable resistant material—as, for instance, steel. The inner member consists of two sections adapted to be screwed together, thus securely connecting the sections, yet allowing them to be separated readily whenever this is desired.

773,504. Running Gear for Vehicles.—James H. Jones, of Bristol, Conn. October 25, 1904. Filed July 10, 1903.

The subject of this invention is a novel method of fastening side springs to the rear axle which allows of adjustment of the chain tension by means of distance rods. The outer rear axle bearing blocks are formed with two pairs of lugs, one pair extending upward and the other forward from the axle. To the former is hinged the end of the side body spring,

No. 773,504.

while to the latter is hinged the radius rod. The radius rods provide an adjustment for the transmission-chain and serve to hold the spring block so that the end of the springs will remain in position above the axle and aid in taking the drag of the chain while the vehicle is being propelled either backward or forward. In traveling over uneven surfaces the springs yield in the usual manner, but both of the hinged connections preserve approximately their set positions, so that the tension of the chain will remain uniform irrespective of the bend of the spring.

773,142. Friction Block for Vehicle Tires.—Charles D. Heaton, of Vincennes, Ind. October 25, 1904. Filed November 19, 1903.

The invention relates to shoes which are to be applied to the rubber-tired wheels of automobiles to prevent their slipping in snow. The blocks are stamped from sheet metal and formed with external ribs and corresponding internal grooves. When the shoes are applied to a tire, the rubber of the tire will be forced into these grooves and aid in preventing slipping. Clamping straps are hinged to the two sides of the friction block by which means the block is secured to the rim of the wheel. One of the straps is made of considerable width and with notches in its edge to engage the wheel spokes, in order to prevent displacement or creeping of the blocks. Five or six blocks are said to be a suitable number for automobile wheels.

773,414. Transmission Gear.—Alden E. Osborn, of New York, N. Y. October 25, 1904. Filed November 16, 1903.

A "two speed and reverse" planetary change speed gear in which only a single driving pinion, a single set of planetaries and a single internal gear are employed. To obtain the three different gear changes with this reduced number of gears, the internally toothed drum and pinion carrier are arranged so they can be slid bodily lengthwise of the shaft and thereby either one or the other connected positively to the sleeve carrying the driving sprocket. Each of the two parts has internal gear teeth cut upon it, and with these teeth are adapted to engage the teeth of a spur pinion integral with the sprocket sleeve. A coiled spring normally holds the sprocket sleeve secured to the pinion carrier, which gives the low speed forward when the brake band is applied to the internally toothed drum. By means of a bell crank pivoted on the running gear the gear drums can be shifted to the left and the sprocket sleeve thereby connected to the internally toothed drum. Then, by applying the brake band to a drum secured to the pinion carrier, the reverse speed may be obtained. For high speed, the whole gear is locked together by a friction clutch.

772,420. Means for Regulating Steam Generating Systems.—Hermann Lemp, of Lynn, Mass., October 18, 1904. Filed October 2, 1902.

772,949. Throttle and Steering Lever for Automobiles.—Charles W. Meyer, Odebolt, Iowa. October 25, 1904. Filed February, 29, 1904.

772,979. Carbureter for Hydrocarbon Engines.—Baptiste Vaurs, Paris, France. October 25, 1904. Filed February 16, 1903.

773,021. Explosion-Motor.—Shirley S. Lewis and Albert Lewis, Syracuse, N. Y. October 25, 1904. Filed March 18, 1902.

773,168. Sparking Plug.—Charles F. Splitdorf, New York, N. Y.. October 25, 1904. Filed March 13, 1903.

773,231. Carbureter.—Charles R. Smith, Manilla, Iowa. October 25, 1904. Filed October 26, 1903.

773,245. Cooling Motors.—John T. Cappell, Vincennes, Ind. October 25, 1904. Filed July 7, 1902.

773,339. Automatic Regulating Device for Explosive or Internal-Combustion Engines.—Francis M. Rites, Ithaca, N. Y. October 25, 1904. Filed November 13, 1903.

773,430. Power-Transmission Mechanism.—Clark Sintz, Grand Rapids, Mich. October 25, 1904. Filed January 26, 1903.

773,474. Lever Mechanism.—Lee S. Chadwick, Ridley Park, Pa. October 25, 1904. Filed December 31, 1902.

773,480. Automobile-Frame. — Frederick W. Darnstaedy, New Britain, Conn., October 25, 1904. Filed May 2, 1903.

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The Importance of the Agent.

Until about four years ago the early, successful manufacturers of automobiles declined all offers of would-be agents, as they had no difficulty in selling all the machines they could make, and did not care to pay an agent's commission. In 1901, however, the number of practical machines and the capacities of the individual manufacturers having greatly increased, most of the leading firms found it advisable to establish branches or agencies in all the large cities, and from that time on the agent has continued to grow in importance as a factor in the automobile business. At present many more cars are sold through agents than by manufacturers direct, and the product of a few large concerns is disposed of almost entirely to agents.

In any city where a considerable number of cars are represented, a manufacturer not represented and located at a distance will find it practically impossible to make a sale. The present day purchaser wants to be convinced of the merits of a car by demonstration rides, etc., and will not, as a rule, make a lengthy trip to a factory if he can inspect and test many different makes right in his home city. Then, too, there are many real advantages to the new owner in the fact that an agent for his car is conveniently located in his home town. He will receive more careful instruction in the operation of his machine, and in case of any difficulty during his early experience it will be a great aid to have the agent near to advise and assist. Agents usually carry a considerable stock of repair parts, and a break or wear-out necessitating the renewal of a part causes less delay if the part can be supplied by the agent from stock than if it had to be shipped from the factory.

Finally, in the smaller cities, if a car is bought from a dealer well and favorably known, it is an assurance to the purchaser that he will be treated fairly in every respect, and that the manufacturer's guarantee will be lived up to. In view of these several facts, the automobile purchasing public prefer to deal with agents, and manufacturers are therefore obliged to appoint agents for all territory in which they expect to do any considerable business.

Since the local markets are thus controlled by agents, and the local business is divided among them largely in proportion to their respective business ability, reputation for integrity, etc., manufacturers are deeply concerned in securing the most capable agents in every locality. As the movement progresses the differences in the actual value given for the money by different manufacturers will be shaved down finer and finer, and the different models will more closely approach each other in general design. This renders the choice between the different makes of cars constantly more difficult for the purchaser, and sales depend more upon the agents' ability than in the past. The capable agent is, therefore, in great demand at present, and this season, practically for the first time in the history of the industry, his services are being competed for by the leading manufacturers.

Numbering and Interstate Recognition of License Numbers.

Some time ago it was announced that the National Association of Automobile Manufacturers would bring a test case to decide the constitutionality of the licensing and numbering laws in force in several States, and had instructed its attorney to prepare an opinion on the subject. This project has evidently now been dropped, because after the last meeting of the association's committee, at which counsel had advised them that numbering was contrary to the constitutions of most States, it was announced

that the committee showed no disposition to have numbering abolished altogether, and the matter had been tabled. In this the committee has evidently been influenced by the action of the Chicago automobilists, who recently abandoned their fight of several years' duration against numbering. It is also not unreasonable to assume that the project was originally inspired by the success of the Chicago Automobile Club in securing an injunction restraining the Chicago municipal authorities from enforcing the numbering ordinance against its members. The latter finally came to the conclusion, however, that the game was not worth the candle—that the continual wrangling with the authorities was a much greater annoyance than carrying numbers. Possibly they also found that their leaders in this movement were animated more by a desire to achieve notoriety than by a determination to defend their rights, and so became disgusted.

The National Association has now instructed its counsel to render an opinion regarding the recognition of tourists' licenses in other States than that in which they are issued—whether it is incumbent on State authorities to honor the licenses of other States when presented by tourists. This is certainly a much more promising subject than the possible total abolition of licenses. The necessity of taking out licenses in different States when about to start on a tour is a great bother, and can hardly fail to restrict interstate touring. The States, therefore, serve only their own interests if they remove this restriction, for it may be presumed that every State is anxious to attract as many auto tourists as possible.

A recent incident on the north shore in Massachusetts has led to the suggestion of co-operation of the automobile licensing bureaus in the different States for the purposes of punishing speed offenders, which is of interest in this connection. It appears that a Pennsylvanian who spent the summer in that locality was guilty of several offenses and steps were taken to revoke his license. He has since lift Massachusetts and will probably not be back there next summer, so that the revocation of his license will not affect him in the least. Now it is suggested that if an automobilist violates the laws of some other State than that in which he resides, the prosecuting authorities might send the records of the case to the authorities of the offender's home State, where appropriate action might be taken. There really seems to be no necessity for such co-operation; the prosecuting authorities may inflict all the ordinary penalties provided by statute, fines and imprisonment, and there will rarely be occasion to suspend the license of a tourist.

Change Gear Design.

In the present issue we publish the first of several articles on sliding pinion change gear design, treating the subject particularly from the standpoint of speeds and stresses allowed. The sliding pinion change speed gear is recognized to be particularly adapted for cars with powerful motors and where more than two forward changes of gear are required; it has already made great headway in this country and now practically divides the field with the planetary gear—the separate clutch system, though so far tenaciously adhered to by some of the older manufacturers, and perhaps with good reason, having found little favor with the newer manufacturers. As the general trend in touring car design is still toward higher horse powers, it is more than likely that the use of sliding change gears will continue to grow more common.

From the data furnished in the article, it will be noticed that the great majority of American manufacturers using this type of gear have adopted the arrangement whereby a direct drive is secured for the high speed but a double gear transmission in the gear box is required for the other speeds. Most of the European manufacturers, on the other hand, retain the original arrangement of a single gear reduction in the gear box for each speed. This difference in American and European practice is largely explained by the further difference that most of the American cars for which the data is given are fitted with a three-speed gear, while most of the European cars have a four-speed gear. The direct-drive gear offers advantages over the other type when the high gears of both are compared, but must be considered slightly inferior for any of the lower gears, as there is naturally more noise and more loss of power with two pairs of gears in mesh and each pair transmitting the full power of the engine, than if the engine power is transmitted only through a single set. Now, with a four-speed gear and the gear ratios adopted on most European cars, a car is operated about as much on the third speed as on the fourth, and certainly more on the three first speeds combined than on the fourth speed, so that on such a car the advantage of a dircet-drive fourth speed would be overshadowed by the disadvantage of the double gear transmission for the three lower speeds.

American three-speed cars, on the other hand, are generally geared so the car can be driven on the dircet drive a very large proportion of the time, and the disadvantage of double reduction for the lower gears is less onerous. Besides, American manufacturers using the sliding pinion change speed gear have to compete with the direct-drive-on-the-high-speed planetary change gear, which is another reason why they should adopt the direct drive arrangement.

Disk Wheels.

One of our contributors in a recent issue extolled the merits of disk wheels for automobiles used in a business way, that is, more or less continuously, and requiring therefore frequent cleaning. He admits, however, that prejudices of taste would be a great obstacle to their introduction.

These disk wheels, consisting of two flat-truncated pressed steel disks uniting a steel hub and rim, were introduced in France a few years ago on racing cars, with the special object of obviating the air resistance engendered by the motion of the spokes. The same object had been accomplished before in a sort of makeshift manner by covering ordinary wheels with cloth on both sides.

If the disk wheel should ever be introduced extensively on ordinary cars, it would not be on account of the diminished air resistance which it insures, because at ordinary speeds the air resistance to the motion of the spokes is quite small, but because a disk wheel is easier to keep clean than any other, and probably also because it can be made stronger than any other of equal weight. From an engineering standpoint there appears to be absolutely no objections against the disk wheel, but we fear that strong æsthetic reasons will be urged against its adoption on pleasure cars. To the superficial observer it would appear almost like a reversion to the most primitive form of vehicle v heel, the flat wooden disk, as still used in China, for instance. The disk wheel conveys the impression of great weight and clumsiness, and of being, therefore, ill-adapted for use on a fast-moving

vehicle. A precisely similar view prevailed among the general public when the pneumatic tire was first substituted for the solid on bicycles. Needless to say, the view of the public in this regard has since been completely changed; and so it will be with regard to disk wheels if they should prove to possess a balance of merits over demerits. Aesthetic taste is acquired and subject to change, and while it may retard it cannot prevent the adoption of mechanical improvements, but must adapt itself to the changes of mechanical progress.

The Glidden Cup.

The American Automobile Association at its last meeting formally accepted the cup offered by Charles J. Glidden for a touring competition to be held under conditions mentioned in the deed of gift, and the prospects are therefore that one of the road competitions next season will be for this cup. The offer of the cup was made at the time of the St. Louis tour, and the donor undoubtedly had in mind a run similar to that, but organized under contest conditions. It will be remembered that the St. Louis tour was really the outcome of an agreement between the American Automobile Association and the National Manufacturers, the latter deciding not to hold a road contest the present year, but to support the St. Louis tour. Originally planned as a demonstration of private owners, the tour eventually developed largely into a trade event. The Glidden Cup contest is also intended for private users, and it is stipulated in the deed of gift that the cars must be driven by their owners, who must be members of the American Automobile Association, or the owners must at least be passengers in the cars. Among the other conditions are that an entry fee of $100 must be paid for each car and that a distance of between 500 and 1,000 miles must be covered in a week.

These rules are extremely impracticable, to say the least. How many bona fide private owners are willing to pay $100 for the privilege, and to subject themselves to the hardships of an organized endurance run extending over one or two weeks and continuing regardless of road, weather and other conditions? As an illustration of the possible difficulties under extreme conditions, we need only mention the New York-Pittsburg contest of 1903. It requires something more than the average amateur's enthusiasm to continue under such circumstances. Few private owners completed any great part of the run to St. Louis, which, in theory at least, was not a competition but simply a private tour en masse. There are, of course, exceptions to every rule, and we have no doubt that there will be a few private automobilists who will be anxious to participate in such a run, but if the contest should bring together any considerable number of starters, one may feel reasonably sure that the majority of them are manufacturers' representatives in disguise.

Sliding Pinion Change Gear Design.

By P. M. Heldt.

Aside from the published dimensions of a few actual change-speed gears, nothing has so far appeared in the technical press or automobile book literature regarding the dimensioning of change-speed gears of the sliding pinion type, and most of the designers who have adopted this type of gear have had to grope in the dark in determining the proper dimensions. It is, therefore, not surprising that there should be great variations in practice as to gear speed and working stress allowed, and this is actually found to be the case from the data on sliding gears which we have recently collected. For the purpose of this article we have been furnished with full dimensions of their gears and of the engines in connection with which they are used by the following American manufacturers, including nearly all the more prominent concerns in this country using this type of change-speed gear: Geo. N. Pierce Co., Autocar Co., Smith & Mabley, Electric Vehicle Co., Peerless Motor Car Co., E. R. Thomas Motor Co. and Packard Motor Car Co. We have also collected the dimensions of the following foreign cars of prominent make: Mercedes, Panhard, Georges Richard, Decauville, Martini and C. G. V.

In calculating the strains on the gears, the first thing to determine is the horse power of the engine. Instead of using the rated horse power and normal speed, we shall assume the mean effective pressure during the power stroke to be 75 pounds per square inch, the mechanical efficiency 75 per cent., and the normal speed, or speed of greatest power, that corresponding to a piston speed of 800 feet per minute—and calculate the power developed on the basis of these assumptions. Designating the number of cylinders of the engine by n and the cylinder bore by d, the foot pounds developed per minute is, evidently,

$$\text{ft. lbs. p. m.} = \frac{n\, d^2\, \pi\; 75 \times 800 \times .75}{4 \times 4 \times 2}$$

or 8830 n d. The following table has been calculated by means of this formula:

TABLE I.

Name of Car.	n.	d.	l.	ft.-lbs. p. m.
Autocar	2	3¾"	4	248,000
Richard-Brasier .	2	4	4	288,000
Columbia	2	5	4¼	441,800
Decauville	4	4	4.2	565,000
Thomas	3	5	5½	618,000
Peerless	4	4¼	4¾	638,000
Columbia	4	5	5	883,000
Packard	4	3⅞	5⅛	541,000
Martini	4	4⅝	5	755,500
Mercedes	4	3.2	4	362,000
Panhard	4	3.64	5.2	468,000
Pierce	4	3.94	4¾	548,000
Mercedes	4	4	5	565,000
Panhard	4	4.4	5.6	684,000
C. G. V.........	4	4.4	4.8	684,000
S. & M.........	4	4.5	5½	715,000
S. & M.........	4	6.6	6.6	1,538,500

The gears used on these cars are of two kinds, viz.: those on which the drive on the high gear is direct and which for the other gears have a double reduction of motion in the gear box, and those in which the power is transmitted from one shaft to another for every gear. A calculation of the pitch line velocities employed and other factors in connection with the different gears shows that for our present purpose it is well to divide them into two classes as above. It is also found desirable to divide the direct-drive gears again into two sub-classes, as seven of the nine gears in the class have the pair of gears remaining always in mesh located at the engine end, while two have them located at the drive end, which makes considerable difference as far as the pitch line velocities and pressures are concerned. This classification has been observed in the above table.

The first problem in connection with the design of a change-speed gear is, of course, to lay it out to give the requisite reduction factor for the different speeds. The average reduction factor of the low gear in the three-speed gears considered herein is 3.2, while the average reduction factor for the intermediate gears is 1.6. In other words, in a three-speed gear the low speed is made on an average equal to one-half the intermediate, while the latter is five-eighths of the high.

In four-speed gears the reduction factor for the low gear or first speed has an average value of 4; the factor for the second gear, 2.25, and for the third gear, 1.45.

In the different American gears, teeth of 5, 6, 7 and 8 pitch are used, the larger size teeth where large powers are to be transmitted, and the smaller teeth where the power to be transmitted is small. The 5-pitch tooth is only used on the one racing car in the list. It is well known that a gear of given diameter and face is stronger almost in proportion to the circular pitch of its teeth, and gears with large teeth are also meshed more easily, but, on the other hand, they are more noisy. The gears on the foreign cars are cut with teeth of metric pitch, and it will be observed that in several of them two different pitches are used—a finer pitch for the gears ordinarily in use and a coarser pitch for the low gears, which require to be exceedingly strong but need not be so smooth-running. There are two metric pitch systems in use, in one of which the circular pitch of the teeth is always a

whole number of millimeters (and the pitch diameter therefore an irrational number), while in the other system the circular pitch in millimeters divided by π is a whole number, like in the standard American system. The latter system is the one most generally employed. The different pitches that are used for automobile work correspond to the following inch diametral pitches: 5.08, 5.66, 6.35, 7.05 and 7.94. The latter two, it will be noticed, are quite close to 7 and 8 respectively.

From the stroke of the engine as given in Table I, the assumed piston speed of 800 feet per minute and the pitch diameters of the gears as obtained from the drawings, the following table of pitch line velocities has been calculated:

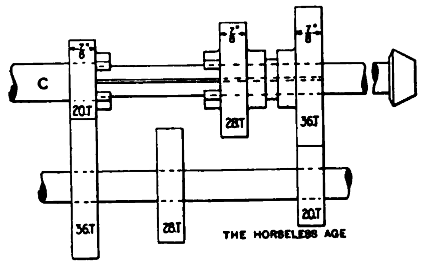
TABLE II.

Car.	Countershaft Gears. P. L. V.	Pressure Transmission. Lbs.	Second Intermediate Gear. P. L. V.	Pressure.	First Intermediate. Gear. P. L. V.	Pressure.	First Gear. P. L. V.	Pressure.
Autocar	786	316	—	—	610	407	437	568
Richard-Brasier	855	330	—	—	710	398	500	565
Columbia	982	450	—	—	772	572	527	838
Decauville	990	571	—	—	761	744	457	1237
Thomas	646	956	—	—	490	1260	355	1744
Peerless	774	858	616	1037	510	1251	360	1773
Columbia	670	1318	582	1520	460	1920	335	2640
Average	815			612			424	
							741	730
Packard	579	934	926	584	—	—	356	1520
							448	668
Martini	594	1272	950	795	1829	568	1130	1686

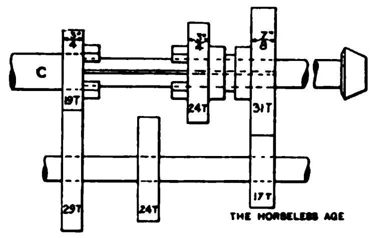
TABLE III.

Car.	High Gear. P. L. V.	Pressure.	Second Intermediate Gear. P. L. V.	Pressure.	First Intermediate Gear. P. L. V.	Pressure.	First Gear. P. L. V.	Pressure.
Mercedes	2050	176	1800	200	1035	350	810	447
Panhard	1414	331	1217	384	921	508	560	836
Pierce	1146	478	—	—	794	690	528	1038
Mercedes	1661	340	1424	396	1110	510	799	707
Panhard	1554	440	1272	538	918	745	565	1211
C. G. V.	1500	456	1310	522	1020	670	524	1305
S. & M.	1407	508	1217	588	950	758	684	1045
S. & M.	1522	1093	1332	1155	—	—	685	2246
Average	1532		1367		964		644	

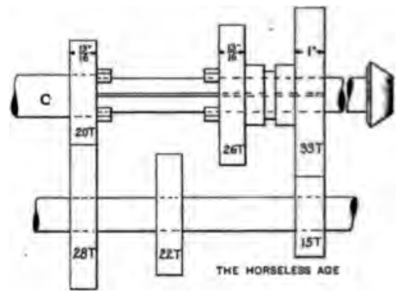
An inspection of the pitch line velocity columns of the two tables shows at once a great difference between the two systems of gears; the pitch line velocities are almost double with the Panhard type of gear as with the direct drive. In the Panhard type of gear the "high-speed" set of gears has the highest pitch line velocity, while in the direct drive gear with countershaft gears located on the engine end, it is this latter pair of gears which runs at the highest pitch line velocity. Among the Panhard type gears the Mercedes shows by far the greatest pi l. v., viz.: over 2,000 feet per minute, owing to the large diameter gear wheels employed on this car. Such a high gear velocity is, of course, only practicable with extremely careful workmanship, as otherwise the gears would run very noisy. The short gear shafts and double sliding sets of the Mercedes also aid in rendering the use of such a high speed possible. It will be noticed that most of the American gears are of the direct drive type, while of the foreign ones most are of the Panhard type. With the former the average pitch line velocity for the countershaft gears is 815 feet per minute; for the intermediate speed gears, 612 feet per minute, and for the low speed gears, 424 feet per minute. With the Panhard type of gear, on the other hand, the average pitch line



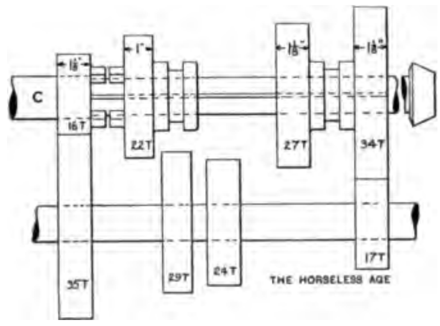
AUTOCAR TWO-CYLINDER, 3¾ x 4. PITCH 8.



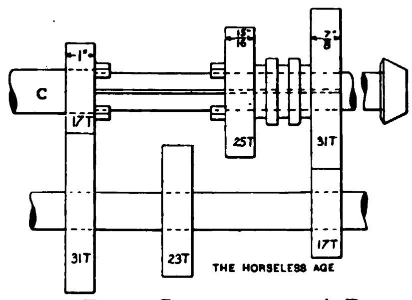
RICHARD BRASIER TWO-CYLINDER, 100 x 100. PITCH, 7.



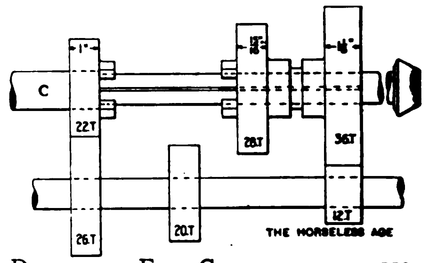
COLUMBIA TWO-CYLINDER, 5 x 4¼. PITCH, 6.



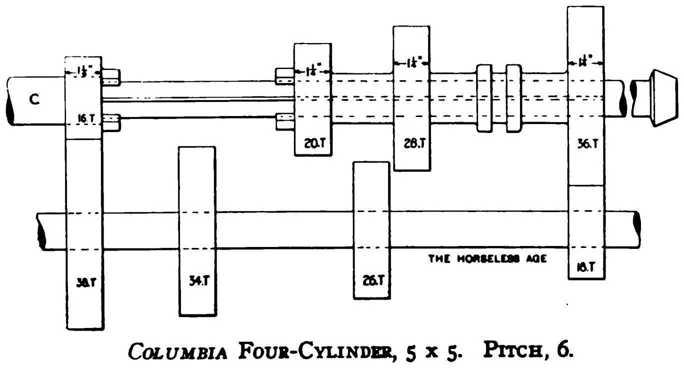
PEERLESS FOUR-CYLINDER, 4¼ x 4¾. PITCH 6.



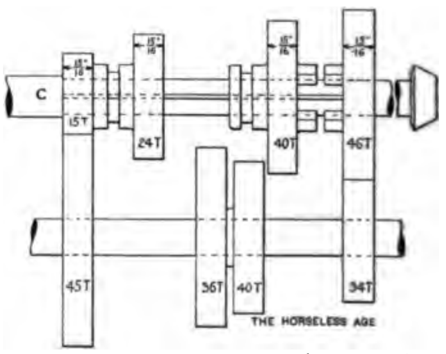
THOMAS THREE-CYLINDER, 5 x 5½. PITCH, 6.



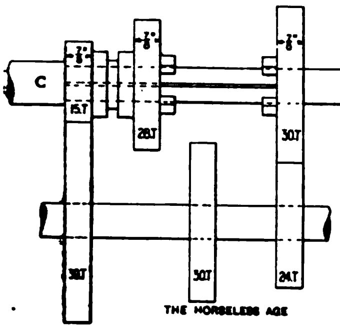
DECAUVILLE FOUR-CYLINDER, 100 x 110. PITCH, 7.



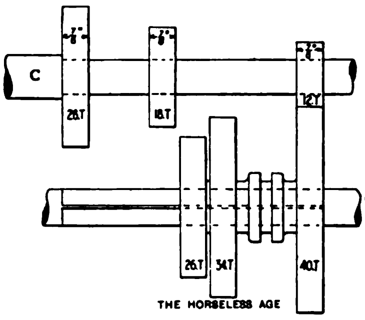
COLUMBIA FOUR-CYLINDER, 5 x 5. PITCH, 6.



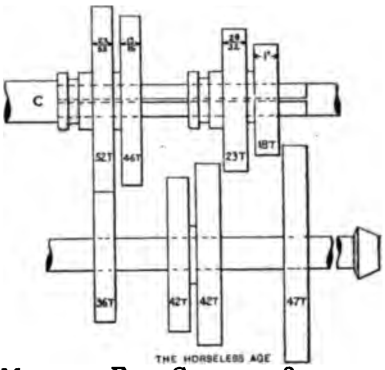
MARTINI FOUR-CYLINDER, 4⅝ x 5. FIRST AND SECOND GEARS, 6.35 PITCH; THIRD AND COUNTERSHAFT GEARS, 8.42 PITCH.



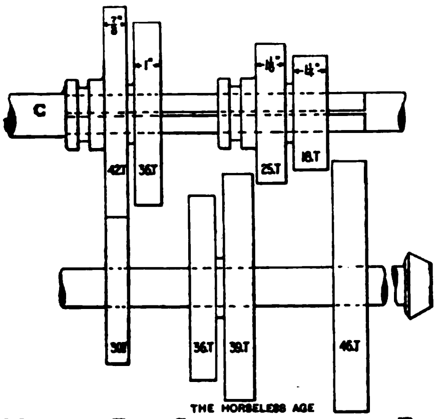
PACKARD FOUR-CYLINDER, 3⅞ x 5⅛. PITCH, 6.35.



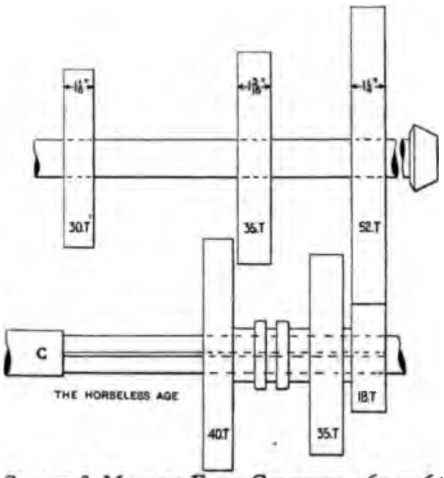
PIERCE FOUR-CYLINDER, 3 5/16 x 4¾. PITCH 6.



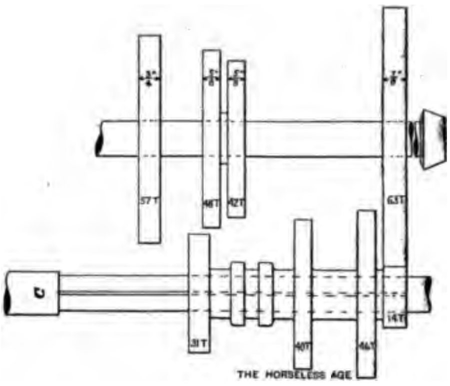
MERCEDES FOUR-CYLINDER, 80 x 100. PITCH, 7.



MERCEDES FOUR-CYLINDER, 100 x 125. FIRST AND SECOND GEAR, 5.66 PITCH; THIRD AND FOURTH GEAR, 6.35 PITCH.



SMITH & MABLEY FOUR-CYLINDER, 165 x 165. PITCH, 5.



C. G. V. FOUR-CYLINDER, 110 x 120. FIRST GEAR, 7 PITCH; OTHERS, 8 PITCH.

velocity of the high gear is 1,532 feet per minute; of the third gear, 1,367 feet; of the second gear, 964 feet, and of the low gear, 644 feet.

In calculating the strength of the gears, we will make use of Lewis' formula and coefficients, which seem at present to be the most generally employed of the many formulæ for the strength of gears. This formula was presented in a paper read before the Engineers' Club of Philadelphia in 1893, and was further discussed in the *American Machinist* of June 22, 1903. According to Mr. Lewis, a gear will transmit a pressure

$$w = s. p. f. y.,$$

where w is expressed in pounds s is the safe working stress for the particular speed; p is the circular pitch in inches; f the face of the gear in inches and y a factor depending upon the form of the tooth. The values of y for gears with different numbers of involute teeth of 15° are given in the following table:

TABLE IV.

12 teeth	.067	21 teeth	.092
13 "	.070	23 "	.094
14 "	.072	25 "	.097
15 "	.075	27 "	.100
16 "	.077	30 "	.102
17 "	.080	34 "	.104
18 "	.083	38 "	.107
19 "	.087	43 "	.110
20 "	.090	50 "	.112

Since w, p, f and y are all known, we may easily calculate s by means of the equation

$$s = \frac{w}{p. f. y.}$$

This has been done for all the different gears, and the result is given in tables V and VI:

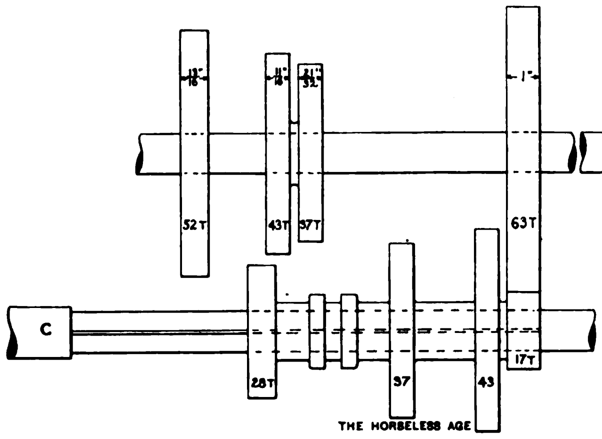
In studying the above tables, particularly Table V, it will be observed that the stresses in the teeth increase with the width of the gear faces. This is due, in part at least, to the fact that not the whole width of the tooth is effective or can be depended upon to take its part of the pressure. In the first place most of the teeth are beveled at the edges on either one or both ends, thus reducing their bearing surface, and, besides, it is impossible to ensure that the sliding pinion shall always be in the exact position opposite the gear with which it meshes. A certain constant width of the tooth may therefore be regarded as ineffective. Let x denote this ineffective width

TABLE V.

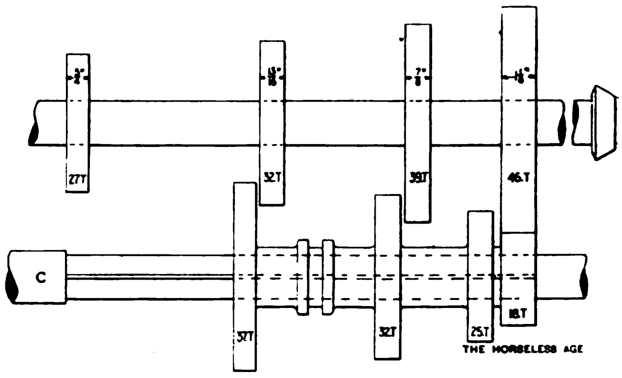
Car.	Countershaft Gear					Second Intermediate Gear					First Intermediate Gear					First Gear				
	w.	f.	p.	y.	stress.	w.	f.	p.	y.	s.	w.	f.	p.	y.	s.	w.	f.	p.	y.	s.
Autocar	816	.875	.393	.090	10210	—	—	—	—	——	407	.875	.393	.100	11830	568	.875	.393	.090	18360
Richard-Brasier.	330	.75	.449	.087	11260	—	—	—	—	——	398	.75	.449	.094	12570	565	.875	.449	.080	17980
Columbia	450	.8	.524	.090	11930	—	—	—	—	——	572	.8	.524	.093	14670	838	.8	.524	.075	26650
Decauville	571	1	.449	.093	10860	—	—	—	—	——	744	.937	.449	.090	19650	1237	1.125	.449	.067	36559
Thomas	956	1	.524	.080	22810	—	—	—	—	——	1260	.937	.524	.094	27300	1744	.875	.524	.080	48650
Peerless	858	1.125	.524	.077	18900	1037	1	.524	.093	21280	1251	1.125	.524	.095	22340	1773	1.125	.524	.080	87600
Columbia	1318	1.25	.524	.077	26130	1520	1.25	.524	.092	25220	1920	1.25	.524	.098	29910	2640	1.25	.524	.083	48560
	First Gear					First Intermediate Gear					Second Intermediate Gear					Countershaft Gear				
Packard	984	.875	.494	.075	28800	—	—	—	—	——	584	.875	.494	.095	14200	1520	.875	.494	.095	37000
Martini	1272	.937	.494	.075	28930	795	.937	.494	.095	18100	568	..937	.354	.108	15800	1686	.937	.354	.104	48900

TABLE VI.

Car.	High Gear					Second Intermediate Gear					First Intermediate Gear					First Gear				
	w.	f.	p.	y.	s.	w.	f.	p.	y.	s.	w.	f.	p.	y.	s.	w.	f.	p.	y.	s.
Mercedes	176	.718.	393	.105	5940	200	.812	.393	.110	5700	350	.906	.449	.094	9153	447	1	.449	.083	12000
Panhard	331	.656	.433	.106	11000	384	.687	.433	.106	12180	508	.812	.433	.100	14450	836	1	.433	.080	24140
Pierce	478	.875	.524	.098	10640	—	—	—	—	——	690	.875	.524	.083	18130	1038	.875	.524	.067	33790
Mercedes	840	.875	.494	.102	7712	396	1	.494	.105	7634	510	1.125	.556	.097	8406	707	1.25	.556	.083	12260
Panhard	440	.75	.494	.104	11420	538	.875	.494	.105	11850	745	.937	.494	.098	16050	1211	1.187	.494	.077	28000
C. G. V......	456	.625	.393	.110	16880	522	.625	.393	.108	19680	670	.75	.393	.102	22300	1305	.875	.449	.072	52700
S. & M.......	508	.75	.524	.100	12930	588	.812	.524	.108	13420	758	.875	.524	.097	16930	1045	1.125	.524	.083	21880
S. & M.......	1098	1.125	.628	.102	15170	1155	1.187	.628	.105	14760	—	—	—	—	——	2246	1.25	.628	.088	34400
Average					11461					12175					15060					27889



PANHARD FOUR-CYLINDER, 91 x 130. PITCH, 7.25.



SMITH & MABLEY FOUR-CYLINDER, 4½ x 5½. PITCH, 6.

and y the stress in the metal reduced to the remaining effective width. Then, denoting by $f_1, f_2, f_3, \ldots$ the face of the teeth of corresponding gears of the different machines, and by $s_1, s_2, s_3 \ldots$ the corresponding stresses calculated under the supposition that the entire face width was effective, we may write

$$(f_1 - x)\ y = f_1\ s_1$$
$$(f_2 - x)\ y = f_2\ s_2$$

. . . .

putting x y = z, we have

$$f_1\ y - z = f_1\ s_1$$
$$f_2\ y - z = f_2\ s_2$$

. . . .

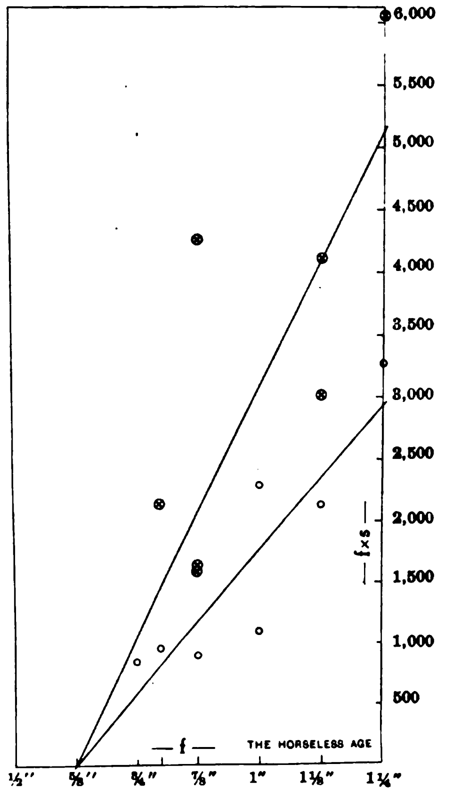
Adding these different equations we have

$$(f_1 + f_2 + f_3 + \ldots)\ y - n\ z = f_1\ s_1 + f_2\ s_2 + \ldots, \ldots \quad (1)$$

where n is the number of equations. In order to obtain the values of the two unknowns which give the closest approximation to all of the calculated gear stresses, we multiply each of the equations in the above series by the coefficient of y and add, which gives

$$(f_1^2 + f_2^2 + f_3^2 + \ldots)\ y - (f_1 + f_2 + \ldots)\ z = f_1^2 s_1 + f_2^2 s_2 + f_3^2 s_3 + \ldots \ldots \quad (2)$$

By substituting the actual values of *f* and *s* in these two equations, we obtain, by a rather laborious process, the values of the unknowns, *y* and *z*, and by dividing z by y, the value of *x*, the constant ineffective width of face. This calculation has been carried through for the high speed pinions of the Panhard type gear, and gives the result



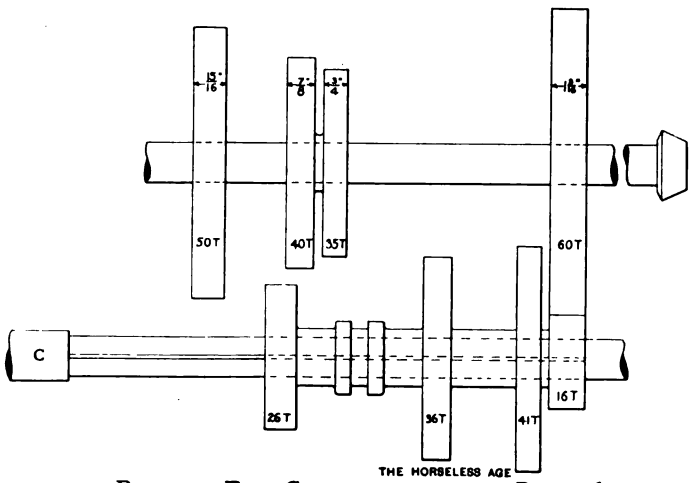
Direct-drive gear, countershaft gears (lower line) and low speed gears (upper line).

$x = .137$; $y = 13970$. Taking round figures, we have therefore as an equation for determining the face width of these gears

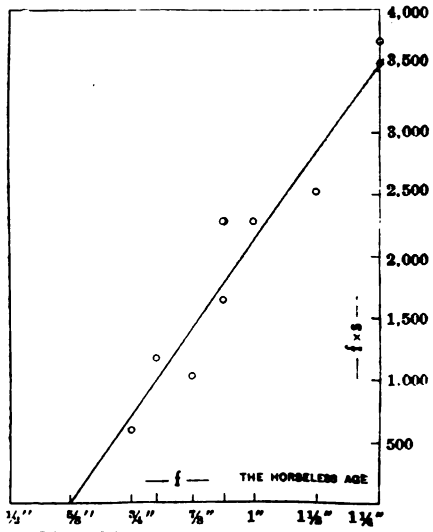
$$f = \left(\frac{W}{14{,}000\ p\ y}\right) + \tfrac{1}{8}\ \text{inch}$$

For the direct drive gear the values of *x* and *y* are most readily found by the graphical method. On a horizontal axis are laid off distances proportionate to the gear faces, and on a vertical axis distance proportional to the product f . s . Points are then located with reference to these axis to represent the width of the different gears and the pressure they support, reduced to a uniform pitch (f . s). If a straight median line be drawn through the points so found, it will represent average practice in "loading" the gears. The two diagrams herewith show that these lines all cut the axis of abscissors at or near the ⅝-inch mark, indicating that ⅝ inch of the width of the gears is ineffective. For the low speed gears the stress for the effective width is 88,500 pounds, for the intermediate gears 57,000 pounds, and for the countershaft gears 47,000 pounds.

For the first, second and third gears of Panhard type change-gear devices, the dimensions of the gears listed do not indicate any ineffective width of face. The above described analytical method when applied to them gives negative results, and when

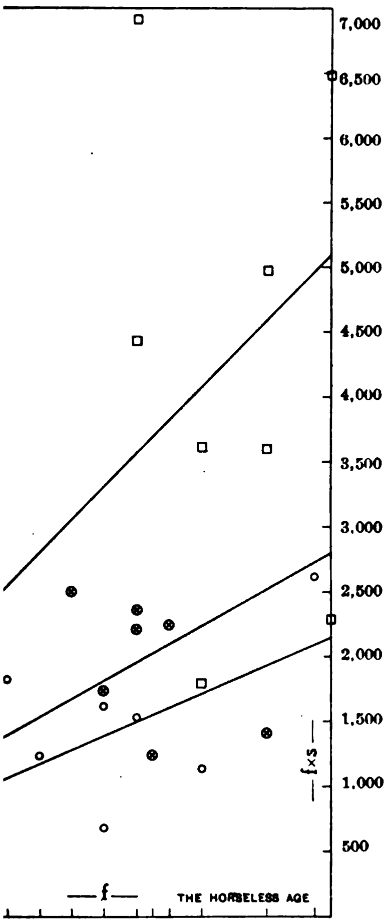


PANHARD FOUR-CYLINDER, 110 x 140. PITCH, 6.35.



Direct-drive gear, intermediate speed gears.

lues are plotted on a co-ordinate dia- they are so irregularly scattered that ractically impossible to draw a fairly ı line through them. No consistent on of stress with width of face is ıble and average practice is best rep- :d by simply taking the average s as given in Table VI. Using round , the average stress for the first gear e taken as 27,000 pounds, for the first ediate as 15,000 pounds, and for the . intermediate as 12,000 pounds.



ırd type gear. Co-ordinate diagram showing ı of width of gear faces to load for first gears (upper slanting line), second speed (intermediate line) and third speed gears slanting line).

SUMMARY.

the calculation of three-speed, direct- gears, we have then the following ons and constants, based upon aver- 'esent practice: The average reduction termediate speed is 1.6; for low speed, Average pitch line velocity of counter- gears, 815 feet per minute; of inter- te speed gears, 612 feet per minute; w-speed gears, 424 feet per minute. ion for finding the proper face width ıntershaft pinions,

$$f_1 = \left(\frac{W_1}{82.500 \times p \times y} \right) + \frac{5}{8} \text{ inch}$$

the intermediate speed pinions:

$$_2 = \left(\frac{W_2}{57.000 \times p \times y} \right) + \frac{5}{8} \text{ inch}$$

the countershaft pinions:

$$c = \left(\frac{Wc}{47{,}000 \times p \times y} \right) + \frac{5}{8} \text{ inch}$$

in which f is the face width in inches, w the pressure in pounds transmitted on the pitch circle; p the circular pitch in inches and y Lewis' constant for the number of teeth.

For calculating four-speed or three-speed Panhard type gears we have the following constants and equations: Reduction for lowest gear, 4; for the first intermediate gear, 2.25; for the second intermediate gear, 1.45. Pitch line velocity of high speed gears, 1,532 feet per minute; of second intermediate gears, 1,367 feet per minute; of first intermediate gears, 815 feet per minute; of low gears, 612 feet per minute. The face width may be calculated as follows:

High speed gears,

$$f_4 = \left(\frac{W_4}{14000 \text{ p y}} \right) + \frac{1}{8} \text{ inch.}$$

Second intermediate gears,

$$f_3 = \frac{W_3}{12000 \text{ p y}}.$$

First intermediate gear,

$$f_2 = \frac{W_2}{15000 \text{ p y}}.$$

First or low speed gear,

$$f_1 = \frac{W_1}{27000 \text{ p y}}.$$

In a following article the application of these equations will be illustrated and the equations further discussed.

TOURING ROUTES

To Saratoga Springs by Automobile.

By N. A. T.

On all our recent short trips in the "steamer" we had had misfortune. The first, we lost a bolt, near home happily, the next, something happened to the rear toggle, letting down the main shaft and nearly carrying us backward down a steep grade. Though the emergency brake saved us from accident, we were stranded five miles from the nearest village, to which we had to be towed. The third trip, to keep up the record, we managed to do something to the machinery so that a loud knocking was noticeable all the way home. After searching for some days, taking apart one thing after another, the surprising fact was discovered that the crank shaft, while it had not fallen apart, had nevertheless, broken, and the secret of the knocking was disclosed. The entire engine was shipped to the base of supplies to be repaired. Meantime we stayed at home. Directly upon its return we set off for a picnic, and this time, had it not been for the ever-handy bit of wire, we would have spent a large part of the evening by the roadside, while some one drove to town for help.

So, you may believe, it was with a feeling of great uncertainty that our second long trip, from Richford, Vt., to Saratoga Springs, N. Y., was set for Monday, the 15th of August last. All preparations for an early start were made. The machinery had been thoroughly overlooked and oiled, the brass polished and the tanks filled, and not a spark of mud or a suspicion of dust could be seen.

The weather was in a dozen minds that morning, but finally decided to be favorable and, in truth, a more delightful day than that is rarely seen. All being so bright and gay, we felt compelled to lay aside our forebodings of ill, and determined to think of nothing but the delights of automobiling as we climbed in and joyously waved farewell to those poor unfortunates who weren't going too. At just 8:20 A. M. we were off, saying all sorts of extravagant things about the day and the machine, and feeling, indeed, glad to be living.

About eight miles out we were thinking what good time we should make to our first city, St. Albans, when we suddenly came upon an open culvert. The trouble really looked serious till we tried the temporary bridge and found we could safely run over that. Our load was lightened, and in a few moments we were across and off again along the pleasant country road.

We kept straight ahead at North Sheldon instead of taking our left turn and going over the mountain, as we had come on our trip north, and found much better road. This way led us by the Sheldon Fair Grounds, well known in that section for the fine exhibits of maple sugar, butter and live stock shown there annually by the farmers of the county through Sheldon Springs and Green's Corners into St. Albans, where we arrived at 11:30 A. M. We encountered some heavy sand and a swamp road, but on the whole the route is preferable to that through Sheldon village.

Although we had many friends there, we did not stop in St. Albans, and soon were enjoying the smooth, hard road, equal to macadam, which runs south from the city for some miles.

We were just revelling in this, our first, chance for speed when our fine road abruptly ended in that worst of all troubles—sand. This, with only now and then a short strip of fairly good highway, had to be endured all the way to Essex Junction, and you can depend that that place, our stop for dinner, seemed very far away as we slowly ploughed along. Milton and Colchester were on the way, but we scarcely noticed what sort of villages they were. After this experience our advice to autoists is: beware of that alluring road just outside St. Albans. You take the hills of Fairfax rather than the sand of Milton, unless your machine will not climb hills at all. We have tried both ways—but don't you. There had been no rain for weeks, and the sand was, oh! so deep. Nearly into Essex we were struggling along, making some headway but no time, when we were so ill-fated as to meet two ladies in a carriage in the middle of a long sand hill. At sight of us one

ROAD FULL OF BOULDERS.

SAMPLE OF NEWLY WORKED ROAD.

jumped and the other, in her haste to get away, turned the horse so sharply as to nearly run over her companion, who was crawling up the bank to a place of safety, and barely escaped overturning the carriage. She drove far out into a field and waited. We asked the woman who had jumped if she were hurt, but she was either too frightened or too angry to answer. Had they given us the opportunity, we would have helped them, but they didn't. Who would have been to blame had any serious trouble occurred? The autoists, of course.

The result of our stop was that, when we wanted to go, we couldn't, so we all got out but the driver. The car started, but soon stopped—stuck in sand way over the tires. Here is where we all pushed. With this aid the machine pulled itself out of the hole and went on to the top without further trouble, and, so far as we could observe, without injury. But the strain must have been very great, and we would go miles out of our way to avoid a similar experience.

A few moments later we were partaking of the good 50-cent dinner set before us at the Johnson House, just by the railroad station in Essex Junction, and complimenting ourselves on having been only two hours and ten minutes on the way from St. Albans, 25 miles. But from the way we skipped along the first half of the distance we could realize what time it takes to plough through a mile of sand—to say nothing of the gasoline consumed. Eight gallons were necessary to replace what had been used in running the 55 miles that forenoon.

At 2.25 p. m. we were ready for the start again, and set off in the sand for Burlington. After about two miles of this we came to the fine macadamized street which runs the length of Uncle Sam's property, Fort Ethan Allen. The good buildings and well-cared for grounds at once attracted our notice. The barracks appeared new and commodious and the officers' quarters were very attractive. From the granite water tower a fine cross-country view of mountains, valley and lake greets the eye, and, all in all, the place seemed a pleasant one. From Essex Junction to Burlington runs an electric car line, so there's opportunity for recreation for the soldiers. Just beyond the fort are the Fanny Allen Hospital and several fine homes.

We touched the edge of Winooski, an active, prosperous appearing place with large mills and comfortable dwellings, and found good roads along the river past the Athletic Park, entering Burlington, the Queen City of Vermont by Winooski avenue. By running down Pearl and Church streets, we got a good idea of the business section of this beautiful little city of homes. It is acknowledged by many to be the prettiest city of its size on the continent. Situated as it is, on the side hill sloping to the lake, a most charming view of Champlain and the Adirondacks may be had from

LEAVING THE ADDISON HOUSE, MIDDLEBURY, VERMONT.

ONLY BREAKDOWN ON THE TRIP.

almost all parts of the city. We drove in and out, along the broad streets lined with beautiful homes, then after a twenty-minute delay for camera plates, left the city by South Union street, a fine shaded drive with attractive residences. The Waubanakee golf links, where just then the society folk were enjoying the game, lay at our left and several fine estates bordered the highway for some distance, beyond which were the most prosperous farms we had ever seen. Such fertility and such fine location! Even farming might be a pleasure under such circumstances.

Along this almost perfect speedway we bowled, passing a car of the same make, and it was with a real brotherly feeling that we saluted. They also carried five and were touring—if dust may be taken for a sign.

Good dirt road lay at the end of the macadamized, and we were not obliged to slacken speed till we reached Shelburne, the first village out, where we ran up in front of a store to ask how far it was to Middlebury.

Through Charlotte, beyond which we pass in view of the Mt. Philo Inn, a pretty and charmingly located little hostelry at the foot of a small mountain around which winds a carriage drive, and through the adjoining village of Ferrisburg we encountered a great deal of sandy road and some rough hills. Here we met the first really nervous horse we had seen, but had no difficulty in passing. Evidently motors are much more common on the west side of the Green Mountains than on the east, for on our trip from Boston to the Canadian line we saw many narrow escapes and had to stop continually for nervous animals, both human and brute. Here also we were convinced that the road-hog may sometimes be the farmer, not the autoist, for one man kept his team directly in front of us up a long hill when it would not have been the least inconvenience for him to have allowed us to pass. Did he want to show us his dislike of modern invention and that he could cause us some annoyance even yet?

Just after gaining the top of this long hill we came to a strip of fresh gravel completely filling the road for perhaps an eighth of a mile. We got through it in spite of our fears, but did wish the farmers would choose more accommodating seasons for working their roads. As a reward for this, perhaps, we found good smooth "going," as the farmers say, into Vergennes, the oldest and, if we may judge from the main street, one of the prettiest cities in the State.

A long hill, as we left the city, took us to an elevation from which a most magnificent cross-country view was gained. This was our last glimpse of Champlain and its background, those beautiful Adirondacks; for, taking our right at a mile post, telling us that it was eleven miles yet to Middlebury, we soon dropped down a rough, rain-washed hill into the valley again. Here we came, without warning, face to face with a problem. What were we to do? The road, which had been rather low and wet to the foot of the next hill, was being improved. How? By filling it in with great stone, which were, of course, to be covered. But we found them in their uncovered state, and were fully aware that no team, much less a motor car, could run over them. But get by we had to, and get by we did. The road crew helped and before dusk the stones had been thrown over enough so that there was a track between them and the bushes. Along this the driver slowly and carefuly steered the empty car, without mishap. While the men were at work the ever present small boy plied the ladies with questions, so many and with such rapidity that we could scarcely catch them. His determination to find out which one owned the car, though we couldn't fancy what interest it would be to him, was truly laughable, as was his curiosity over the motive power and the lamps.

Our usual good luck—to be at the foot of a hill with no steam on—was with us now, but with a little work at the hand pump we gained the top, as always, much more easily than we thought possible.

Another beautiful picture was spread before our admiring gaze as we looked across the green fields, dotted here and there with the deeper green of a cluster of trees or the white of a distant farm house, or yet, again, with the rich gold of a field of grain sloping down to the shining river which winds southward along the valley, then upward again to the hills and still upward to the ridge of the mountains, guarding, like eternal sentinels, the fertile plain below. All this, bathed in the mellow glow of the late afternoon sunshine, formed a scene too grand for mere words to portray, and one which a lover of the beautiful would travel far to see.

The farms along the roadside showed marked prosperity, and in gazing at the beauties all around us we almost forgot the roadbed was rough and required driving quite slowly. At a fine farm house we stopped to fill the water tank and found the most cordial greeting that we had received since that of the good farmer at Bedford, N. H., who gave us such willing assistance. Not only water for the machine but a cool drink for ourselves, and then the kind woman insisted on our taking also the large panful of luscious apples just brought in from the orchard.

On we went, up hill and down, over indifferent road, till coming into the open at the end of a steep climb we saw below us the roofs of Middlebury. We had turned our course eastward till the mountains now rose between us and the lake, and just at our feet stretched the fair valley of the Otter Creek.

The approach to Middlebury was shady and exceptionally pretty, taking us by some very delightful homes and ending at the common, or park, on the upper side of which is the Addison House, a very attractive hotel where we were to stop for the night. It was seven o'clock, and considering that we had made ninety miles, in spite of delays, the thought of rest and a good supper were naturally not unwelcome. The hotel we found to be a particularly good one and way above any at which we had stopped on our trips previously. The rates are $2 to $3 per day and the car was kept in the stable connected with the hotel without extra charge. (The hostler declared he slept within ten feet of the machine so that no harm could befall it.) After supper we strolled down to the telegraph office to send a message and see the town. Our surprise at the new look which all the buildings had was explained by learning that about a year and a half before the entire business section, including the bridge over the river, was swept away by fire.

(To be continued.)

Through Yosemite Valley in an Automobile.

By An Experienced Automobilist and His Wife.

Some of the difficulties we encountered may seem trivial to experienced chauffeurs, but to myself and wife, who had but two months' experience in driving a car, they appeared formidable; and in view of the fact that others had attempted the trip with professional chauffeurs and failed, I hardly think we exaggerated the difficulties in our own minds.

Our road the first day was via Oakland, Haywards and Livermore to Byron Hot Springs, where we spent the night. After carefully looking over the car, we proceeded on our journey to Stockton, which we had hoped to make the first day.

Leaving Stockton, we made the run to Knights Ferry for lunch. Up to this time we had traveled over comparatively good and level roads. At Knights Ferry the hard work commenced. The road became very hilly, rocky and uneven, although most of it was quite hard, forming a good bottom for the wheels. One stretch, which it was our pleasure to go over in the afternoon, was a down grade of about 10 per cent. for the distance of half a mile, made of loose, broken rock about as large as a good-sized fist, which had just been put on the road, and, being of balsalt formation, the edges were very sharp, and in consequence caused some uneasiness regarding the tires; but it was a case of going from bad to worse, for after leaving the broken rock behind us with a degree of satisfaction, we ran into a stretch of road, about three miles long, with turns as numerous and short as the wriggles of a snake's body, and boulders, from 12 to 18 inches in diame-

ter, so numerous that at times they had to be straddled, with the result that the fly-wheels of both the machine of my friend (who accompanied me) and mine struck on the same rock, and a dent in the flywheel of my machine is mute evidence of the force of the blow. We reached Chinese Camp that evening in time for dinner, with the firm conviction that we had had a very hard day. Fortunately, or unfortunately, I don't know which, we were blissfully unconscious of the fact that that day's experience was but a taste of what we had yet to go through.

Leaving Chinese Camp bright and early next day, we started out to make Crocker's for dinner, a distance of about thirty-five miles. You notice I say "about," for the distance depends so much on the person to whom one applies for information, and the funny part of it is the farther you get away from civilization the shorter the mile in the eyes of the native, but the longer it is to you.

The road out of Chinese Camp leads down an incline of about 16 per cent. on which the dust was six to ten inches deep, although in places weak attempts had been made to oil it. However, the road to the foot of Priest's Hill, about ten miles, is not bad comparatively speaking. After a rest under the trees, the pull up Priest's Hill, which has proven the "Waterloo" of so many machines, was undertaken. Every individual in Chinese Camp, native born and otherwise, had a different opinion as to the length of the climb and the percentage of the grade. After listening to the numerous and varied opinions on the subject, with the usual gratuitous advice as to how best to make the climb, I concluded the hill was two and one-half miles long, and if one figured the grade as uniform it would be about 16 2-3 per cent.; unfortunately, however, for those who attempt the run the grade is not uniform. In many places it is as much as 25 to 35 per cent. for a distance of from 100 to 300 yards. The bed of the road to a depth of six inches consists of loose, decomposed granite, fine gravel and dust, which rolls away from the wheels and simply allows them to spin round. Add to this the altitude of about 3,000 feet, and it offers a variety of automobiling somewhat different to spinning along on the fine level roads one finds round the Bay. To say the least, it makes one feel pleasantly warm. But But joy was ours—we had reached the top without soliciting any four-horse-power assistance, and we had a good lunch and refreshing drink ahead of us. After lunch, an adjustment of the carburetor was made; or, more properly speaking, the carburetor was tuned up, for numerous adjustments were made coming up the hill, which requires 2½ hours, or a mile an hour. If anyone thinks that is slow work let him try it. After adjusting the carburetor, having already been convinced by the people at Priest's Hill that our troubles were over, we continued on our journey with light hearts and contented minds, but it was of short duration, for we were hardly round the turn out of sight of Priest's when we ran into a 30 per cent. grade, with a loose shale rock bed, the shale having but recently been spread, but fortunately the grade was a short one. From there on to Hamil-

In the Famous Yosemite Valley.

, where we spent the night, our trou-were light, as the grade was only about er cent., not more than the machine capable of making without much trou-although the road was very rutty.

: left Hamilton's about two o'clock in afternoon for a short run of thirteen to Crocker's, where we intended to l the night. From Hamilton to the . fork of the Tuolumne River, three , there is nothing to bother any ma-, but immediately on crossing the river commence a good climb over a dusty with loose rock about the size of a big apple, and you keep on climbing he entire distance of ten miles over de varying from 5 to 15 per cent. In ntire distance there is but one stretch ss than half a mile long of anything aching level or down grade.

m Crocker's the road is fairly good, aratively speaking, for a distance of two miles, when it commences to again, and to Gin Flat, about nine . or two miles past what is known : Summit, one has to traverse the worst teepest road of the whole trip. Over siest part of it the grade is not less 10 per cent. and for about 300 yards aching the Big Trees the grade is 35 per cent. and seemed 45 per cent., dust and loose rock fully six inches and short, sharp turns.

the top of this, the last grade of any uence going into the Valley, one finds lf on a granite plateau at an elevation 00 feet, and the real descent into the , a drop of 4,000 feet in about fifteen begins, but even then, owing to the of the decomposed granite on the it is necessary to use the power of the ne, if one is fortunate enough to have it to run down, as coasting is out of estion.

one at all familiar with automobiles adily realize that the constant change ospheric pressure due to rising about feet in approximately 76 miles, means tinual adjustment of the carburetor, nt cleaning of spark plugs and re-of excess deposits of carbon; and un-s is fond of extremely hard work, with of dust and grease thrown in to whet ppetite, he had better not attempt a Yosemite in an automobile. In fact, be a blessing in disguise to enthusias-tomobilists if the park commissioner its taking machines into the valley. however, anyone makes the attempt, ght as well make up his mind that the time the ascent begins fifteen miles will be fast work, and at the end of teen miles he will know he has been ng. He must also make provision for allons of gasoline to every ten miles tance covered.

ve been given to understand that 118 machines have attempted to go into alley, and only six or seven of this r have succeeded in entering.

LESSONS of THE ROAD

A Mysterious Missing.

By J. C. Cunningham.

A friend of mine, a mining engineer, a few months ago bought a two-cylinder car with a French engine in front under a hood. Being a mechanical engineer as well, he made quite a number of alterations in the machine at the start. Of these I will here only mention two, as the others have no connection with this narrative. One of the changes was moving the coils on the dash and placing a force feed oiler in their place, and putting the two coils on the inclined foot board nearest the dash. The second was to add very heavy insulated wire from the coils to the plug. The old wires were not long enough after the change, and he used a very heavy single insulated wire, the kind used around the mine for underground work.

I will not say that these changes made any difference in the operation of his car, but will say I have never seen an automobile of the same make, or any other, that gives the satisfaction this one does. In fact, I have always noticed that the few others of the same kind that I have seen are usually in the repair shop. This one, however, is used almost every day, not on city streets or boulevards but on rough mountain roads. There are two mines about fourteen miles apart that this machine travels between almost daily, with its owner as operator. He takes entire care of it, except washing and cleaning. Sometimes one of the mechanics of the mining machine shop assists him, but he does all the replacing of parts and adjusting. I have ridden many times with him over roads that seemed almost impassable, and it always ran with the same regularity. He had begun to think the machine almost perfect when an incident, or misfortune, occurred that kept him guessing many days before it was rectified.

Friends are always welcome to accompany him on his daily trips, and one day while out with a gentleman friend, a very large man, over six feet tall and weighing more than 200 pounds, the engine showed signs of missing, but caused no trouble or delay. In the afternoon, on his return, he took the car out alone to try to locate the difficulty, but the engine showed no signs of missing. The next day the same man accompanied him on the trip and the same symptoms became manifest again, but with no bad results. On returning from the ride this time, he again took the car out alone to look up the mischief, and it failed to appear again. and no search that could be made showed what caused it.

The third day I accompanied the large man, Mr. W——, and the owner of the car on the usual trip between the mines, Mr. W—— occupying the front seat with the driver. We had not gone far when it was noticed that one cylinder missed occasionally. We stopped to investigate; put in a new plug, though the old one appeared to be good; switched on a new set of batteries and still one cylinder missed while running on the road.

While standing still it never missed, or even going slowly up steep hills when the engine raced: only on a level road when traveling fast, and usually when the road was uneven.

After making the trip that day, I saw the owner make a thorough examination of the car for loose connections or any other cause that might occasion the difficulty, but the search was useless. I went out with him after the inspection, and no speed or even roughness of the road caused a miss that we were able to notice. "Well," the owner said, "W—— puts a hoodoo on this rig every time he rides in it. I'll bet the drinks right now if I go back and get him the engine will miss." Going back we called W—— up and he took my place on the front seat and they started off in a jovial humor to see what would happen. They returned shortly and laughingly stated that the engine had missed.

As I said before, the owner of the car was very conceited regarding his knowledge of gas engines, and his inability to locate the trouble annoyed him more or less.

Strange to say, the symptoms never showed themselves only when W—— was in the car. This continued for several days, when the owner had business in San Francisco and he took the car with him, running it about ninety miles over land and shipping by boat the remaining distance.

Mr. W—— and I met him in the city a few days later, and on inquiry how the machine made the trip, he said, "she never missed a shot on the trip and I have no reason yet to have her repaired, though I brought her here for that purpose." Mr. W—— offered to wager the cigars that if he rode with him it would skip all right, so we planned a ride that afternoon. Going out of town to the park there were no signs of the old symptoms; no engine ever ran nicer, but on the Ocean Drive, where the roads are not so good and where the owner let her out to her speed limits, she missed.

We turned back, drove into town and procured the services of a superintendent of one of the repair shops, called by many an expert. The expert took the wheel by the side of W—— and the owner sat by me in the tonneau. "Nothing wrong with this car," the expert said as we glided along the south side drive of the park to Ocean Boulevard. We had not gone far over the boulevard when he had reason to change his mind.

He stopped, and ran the engine at different speeds while he thoroughly examined it. We remained there nearly an hour while the expert spied into its mechanism, leaving

nothing unnoticed. W—— and I were tired and cold, so told them we would meander along the strand and to pick us up when they wanted ballast. In about half an hour they came along and we took seats in the tonneau. The expert said the machine was all right. W—— answered, "We will show you before we go very far." Though we traveled several miles, there were no indications of misses. "The cigars are on me," said W——, as we neared the Cliff House, "I suppose the hoodoo has vanished, and let us have something on the strength of it."

After refreshments we started home. Mr. W—— took the front seat, being a large man and having more room there. While going over the south side drive of the Park at a good speed the old symptoms appeared again. "Well," the expert said, "the smoke is on me this time, for I can see no reason for this."

The machine remained in the city a week longer and nearly every day it was taken out either by the expert or the owner, and every day that W—— was a passenger the same old trouble existed, especially if he sat on the front seat. When he was not along the symptoms never occurred.

Every acquaintance of the owner and the expert who owned an automobile discussed the subject. Was the thing bewitched, or what was there about W—— that caused such capers? The supposed hoodoo was taken out in other cars to try his influence on them, but trials showed no bad results unless it was causing one merry crowd to be arrested and fined.

The car was brought home to the mountains without the problem being solved. Though W—— was not around, a little later the car began to show signs of missing whenever she ran over rough roads.

One evening the owner was returning quite late from the usual trip when the mysterious cylinder laid down almost entirely, and in his endeavor to locate the trouble he uncovered the coil next to the cylinder missing and did not replace it. It was dark, and while running the engine he noticed a spark where the insulated wire from the plug connects with the coil.

The mystery was now solved, of course. Mr. W—— being such a large man, braced himself against the dash where the wire passed through to connect with the coil and the wire had broken at the binding post where it was bent to make the loop. It was a very large wire, and, no doubt, was weakened where the short bend was made, and the vibration and pressure of Mr. W——'s feet against the dash, where another abrupt turn was made, caused the break. The wire being so heavy and strong, and there being such a short distance between the dashboard and the coil, the wire touched close enough to act its part only when the strain was against the dashboard, which forced it away.

The reason there were no symptoms of missing when W—— was not in the car was *that the wire was always in contact* and would even work properly with him in the machine, except when going fast or over rough places, when he would stretch his legs forward to brace himself.

The coil and wire had been examined many times by different persons, and the wire taken between the fingers and shaken, but being heavy it showed no signs of a break. Continual vibration and wear, however, at last shortened the wire, until it failed to connect even with no resistance against the dash, and the mystery was then solved.

A. A. A. Meeting—The Glidden Cup Conditions.

The Board of Directors of the American Automobile Association at a meeting held at the Automobile Club of America on Wednesday, November 2, formally accepted the deed of gift of the Glidden Touring Trophy. It was decided to hold the annual meeting in this city during the show week, January 14 next. The annual banquet and election of officers for the year 1905 will take place at the Waldorf-Astoria Hotel on the evening of January 16. The conditions which govern the holding of the Glidden Cup contest are as follows:

The Charles J. Glidden Touring Trophy is to be competed for annually by the members of the American Automobile Club or by the members of any club which has been affiliated with the American Automobile Association for at least one year.

The distance is to be not more than one thousand miles, nor less than five hundred miles per week; the course to be laid over regularly used highways of the country where the cup is held, except that in 1905-6-7, the competition shall be held in the United States or Canada, or both.

The entry fee is to be not less than one hundred dollars, half being returned at the start of the contest. Competing cars must be driven by the owner or by some driver properly qualified by the supervising committee, the owner being a passenger in the car.

Rules governing the contest are to be laid down by a committee consisting of the president of the A. A. A., the donor, the presidents of the A. C. A., A. C. G. B. and I., Automobile Club of France, the German Automobile Club and the president of a Canadian Club (if such an one be duly recognized by the A. A. A.)

Commenting upon THE HORSELESS AGE's estimate of the number of automobiles in the country, *Hide and Leather* says: "In view of the best statistics obtainable it appear that there are nearly 17,000,000 horses in the United States, whereas of automobiles in use there are only 39,000. It is a fair assumption, therefore, that harness and saddlery goods and the harness, skirting and collar leather required to make them, will still be wanted in large quantities."

COMMUNICATIONS

An Unusual Carburetor Trouble.

Editor HORSELESS AGE:

I notice in your issue of October 26 an article by Albert L. Clough on "Carburetor Troubles and Their Remedies." In this connection I wish to relate a recent incident with our car. One evening when only a few blocks from home, the engine gave a few gasps and then stopped. Having experienced this before, we looked to our gasoline supply, which was found to be very low, and, of course, we attributed our trouble to lack of fuel. From the time we received the car up to the time of this trouble, all fuel put in the tank had been strained through a chamois skin. The skin used was a new one, and care was taken to keep it perfectly clean. That evening we replenished the supply of gasoline and proceeded homeward, and just as we arrived there, the engine gasped and stopped again, and when started and run a short time it repeated the action. The next morning I ran the car up on to the lawn and removed the gasoline pipe, which proved to be stopped up at one end by a small roll of pulp. This when taken out and dried proved to be formed of the small fibers that came off the new chamois. HAROLD R. WELLS.

Reply o "Packard's" Query.

Editor HORSELESS AGE:

I note the communication from "Packard" in your issue of Oct. 26th. I have been using the Model F Packard for two years and have had experiences similar to those described by him, but I have never found the difficulty in the carburetor. It is usually a "leaking high potential wire." This difficulty can be detected by temporarily connecting the coil with the spark plug by an entirely new wire. If the motor works regularly with the new wire, it can be made permanent. Too much care cannot be used in securing the best wire and attaching it to the car so that it cannot vibrate. EDWARD WETMORE.

Equal Vs. Unequal Front and Rear Wheels.

Editor HORSELESS AGE:

Your correspondent E. W. B. on page 429 asks for reasons why wheels should be of different size. It pleases me to find a man asking for reasons, for rational people can be convinced. Our vehicles are built with different size wheels front and rear, because the size of the wheels and tires should be somewhat proportionate to the load carried. On slippery roads the driving wheels should carry the weight to avoid skidding and secure traction. This we have demonstrated many times by go-

here vehicles loaded heavily in front . The heavily loaded rear requires large in diameter and cross section. ght front does not require so large

We carry the passengers on the ecause they are free from the tiring se shifting of the front end, due steering. We carry the mechanism rear because any engineer knows he highest efficiency is gained by the power near the work. The ront end steers easily, climbs out of acks easily and gives little trouble. made the front wheels larger they be heavier, harder to steer in snow ts, and the tires needlessly more ex- . If we made the rear wheels smal- ey would not ride so easily and the rould give still more trouble. As it rear tires now give much more than the front, which simply proves lightly loaded tire is not trouble-

The question before me, then, is, I add needlessly to the cost, weight fficulty of handling by increasing the the front wheels, which give almost uble, or shall I decrease comfort and e the trouble already found with the heels by decreasing their size simply lely for the sake of having all wheels

The facts show that if any change le, the rear wheels should be larger, to secure conditions more favorable, ere is no occasion to increase the the fronts. Our scrap pile and or- oks indicate that rears wear out three as fast as fronts, and it would seem better to put the new tire on the rear it is new and strong than to put it front until it gets old and then it to the rear.

ought to be sufficient answer to your ondent's question as applied to a carrying the heaviest load at the It may be argued that we should more load in front, but we believe rolling wheel is less damaged by use traction wheel, and that it is less de- re to tires to carry the weight on r and roll them than it is to carry ight on the front and strain and tear rs trying to push the front. I would hear from others on this subject.

only one extra need be carried is g the question. Vehicles should be igned, and tires of such size used, extras need be carried. When I ing, I take a rear air tube and a re- t, and I have always gotten back. should be no more reason why an ire should be carried than an extra Cyclists know that a large sized ill carry them for several seasons ertainty, except for punctures, and e people and auto makers are slowly ing to the necessity for larger tires ll carry the load without overwork- h inch of rubber and fabric.

a worn rear may be used on the poor logic. If followed, one would ave four bad tires and be in a state of continued expectation of trouble. We put the bad ones on the rear, wrap the bad spots and get out what wear there is left in them as quickly as possible. Tires do not improve by keeping. My right gloves wear out faster than the left ones, but I do not buy misfits for the sake of having them interchangeable. We have built vehicles with same size wheels all around, but the difference in riding is perceptible. It is less trouble to the manufacturer to stock one size of rims and tires than two, and requires less capital, but the buyer should look out for results, and he loses more by small rears than he gains by having them interchangeable.

CHAS. E. DURYEA.

The Item of Cost.

Editor HORSELESS AGE:

Thinking it might be of interest to some of your readers, I give herewith an account of the expenses occasioned by operating a gasoline runabout for a period of fourteen months. The machine has been in daily use for the two seasons 1903 and 1904, and the total expenses have been $18 per month, including cost of new clutches, a new transmission, exhaust valves, tire shoe, inner tube and sundry repairs, all gasoline, oil, monthly storage, etc. This car was bought second hand, hence the extra expense of a new transmission, etc., and a new car would have cost less for up-keep. This does not look excessive, as the car has been in daily use for some fourteen months. It may be that there are others who can show an even lower maintenance figure. I have kept no account of the distance run. The car is running better to-day than when I bought it.

G. P. DANFORTH.

Explanation of Carburetor Trouble—Filling Cuts in Tires.

Editor HORSELESS AGE:

You ask for suggestions regarding the carburetor trouble described on page 429 of your October 26 issue. One of my most useful possessions is a model B Packard, and for a long time it gave a trouble that was at least similar to the one described. The engine would run beautifully up to three-quarters speed, but if pushed beyond that, would show signs of "dying," as in your correspondent's case, the symptoms being diminishing power and repeated violent explosions in the muffler. When slowed down a little it was all right again. As the trouble was evidently too little gasoline, we tried weighting the float, which did not help at all on high speed and made the mixture too rich at slow. Then I went over the gasoline supply connections, opening a suspicious telescope joint at an elbow and boring out the gasoline inlet hole at the bottom of the float chamber as much as the size of the valve would allow. Since then there has been no more such trouble, except when the batteries run down, when the symptoms are precisely similar, as you say.

One of your correspondents a while ago was asking for something with which to fill up cuts in the outer rubber of tires. I think that the raw sheet rubber sold for vulcanizing is just the thing if used in the right way. Pry the cut open and wash out with carbon bisulphide (gasoline may do as well). While still wet, drop in a little vulcanizing cement, then let the cut close and go on to the next until around the wheel. Next take a piece of the raw stock and cut off a small piece to about fit the first cut. Dip it in the vulcanizing cement and lay it beside the cut to dry, going on round the tire as before until all the holes are supplied. The little pieces will stick enough to prevent falling off as you turn the wheel. When arriving at the first cut again, pry it open and stuff in the piece of rubber, which is pretty sure to be dry enough by this time. It will immediately weld itself to the sides of the cut, if well tucked in. Of course, this is only for small cuts from one to five-eighths of an inch long—the kind you think nothing of until the water gets through and rots the fabric, when the tire bursts. About a month ago I treated in this manner a ⅝-inch cut in a 34 x 3-inch tire, and it is still water-tight; in fact it is almost impossible to find it. The crude rubber has little strength, but most of it will work out, leaving only just enough to fill the cut and the wear will come on the original material of the shoe at the sides of the cut.

This sounds rather troublesome, but when a tire has a lot of small cuts, one can fill them at the rate of about one a minute, and if the results are satisfactory, as they seem to me now, it is very well worth the little trouble.

GEO. A. BATES.

Breaking of Crank Shafts Due to Location of Fly Wheel.

Editor HORSELESS AGE:

From a short experience I am led to believe that the breaking of motor crank shafts is frequently due to another cause than gyrostatic action as mentioned in your columns a number of times. Amateurs and unexperienced manufacturers often place the flywheel on the free end of the crank shaft, instead of on the transmission or clutch end. This usually makes the flywheel more accessible for removal, but theoretically the feature is certainly wrong.

Suppose that an automobile in which the flywheel is located in this position relative to the engine, stalls on a very steep hill or in deep sand, and requires the maximum torque, the motor is able to develop to propel it. On such occasions the driver will speed up the engine and throw in the

clutch. The speed of the engine is thereby suddenly reduced, owing to the enormous resistance of the load. When the clutch is thrown in, the flywheel on the other end of the crank shaft has a large momentum stored up in it, and throws a great wrenching strain on the crank. In order to make a crank shaft strong enough to stand such strains, it is necessary to put a large amount of extra metal into it. I notice that the great majority of manufacturers seem to be well aware of this point, and place the flywheel at the transmission end, where it properly belongs.

J. Warren Millard.

Finish—Carriage Vs. Machine.

Editor Horseless Age:

I have read Dr. Stapler's letter on Finish in your issue of October 26th with great interest. It is a pleasure to find people that not only have opinions but have reasons for them and are not afraid to express them. The doctor describes very fully why he wants a better finish, and I am inclined to agree with him, but since the finish is the least important part of the vehicle, I am not much interested in this. The object of a carriage is to carry passengers and until autos can be depended upon to get back every time they go out there are certainly more important things than finish. I say this after a long experience and with all due deference to the man who buys because he likes the color of the paint. Two people have recently told me that they had frequently been out in autos but had never before made a long trip and gotten back without trouble. Reports of this kind lead me to believe that there is no subject of greater importance, and because of this I would like to ask the doctor why he favors four cylinders. It is certain that eventually complication becomes objectionable. Where does he think the limit is found; or, in other words, is four better than three or five? and if so, why?

Why does he think buggy forms "horrid"? Carriages have served their purposes for many decades and changing the propelling force does not change the purpose. Why, then, should the comfortable, easy-riding carriage form be abandoned and "a machine" sought for? It should rather be the duty of auto makers to provide a carriage which gives precedence to the needs of the passengers rather than a locomotive on which the passengers perch as best they may, all preference being given to the mechanism. The only argument in favor of this would be that greater reliability can be secured, but this is begging the question and an admission of inability on the part of the makers. The doctor favors accessibility quite rightly, but he also favors indicators and gauges, whereas any user of a steam vehicle having these devices can testify to their many objectionable features. He *favors mechanical oilers*, which add complication and require constant attention; to be sure, they are doing their duty. Nothing is so simple and sure to operate as splash oiling and the only thing needed for perfect results is a constant level, so that the splashing may be the same at all times. In short, before the auto can be largely adopted by the public it must be simplified. We must not look for extremely fine results with extremely complicated and costly mechanism, but for a compromise which gives the maximum of service with the minimum of cost, care and maintenance expense. The auto of the future will, therefore, not be the most complicated to build, but the simplest that can be made to meet its users' needs. It will always be a carriage and must embody carriage features, and every attempt to abandon the carriage idea, so far as the comfort of the passengers is concerned, will be labor wasted. Both autos and carriages have in common this one duty, which is the reason for their existence, and the doctor is certainly in error when he states otherwise.

Chas. E. Duryea.

Gearing Query.

Editor Horseless Age:

I am building a light runabout to weigh between 400 and 450 pounds. Motive power to be a 3½-h. p. gasoline motor, giving its full power at 1,000 revolutions. Transmission will be of the separate cloth type, one for each speed, with sprockets mounted on each drum. Drive will be from two ten-tooth sprockets, on engine shaft to each of the above mentioned clutches, which are equipped with a fourteen-tooth and thirty-tooth sprockets, and then by a ten-tooth sprocket keyed to the transmission shaft to the rear wheels. Twenty-eight-inch wheels will be used. How many teeth on differential sprocket will be required to drive this rig fifteen or eighteen miles an hour?

D. Hooper.

[If you place a fifteen-tooth sprocket on the differential your car will run approximately eighteen miles per hour with the engine running at 1,000 r. p. m. In order to get only fifteen miles per hour, the differential sprocket must have eighteen teeth. The low speed is, of course, approximately one-half of the high speed.—Ed.]

The Chauffeur Question.

Editor Horseless Age:

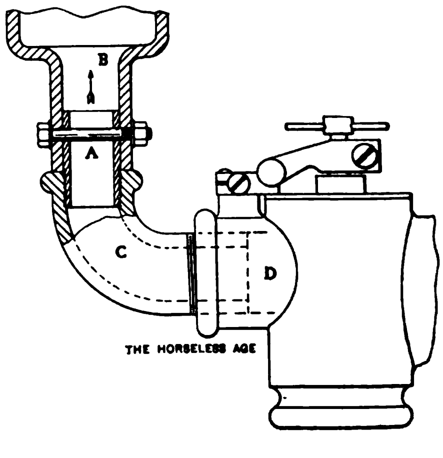
Having been a constant reader of your paper for the past two years or more, I would like to say a few words on the chauffeur question. I am a practical machinist and have been employed in the automobile line as such for the last four years. During this time I have noticed that there are acting as chauffeurs more men who have served their time on the floor of a garage, shining brass and filling tanks, than men from a machine shop. Why is this? When you come to consider that a man has to invest $2,000 and more in a car, you would think he would try to get a thoroughly competent man to care for it. I know of several reasons myself why he often does not do so, which I will state. First, the owner in some cases does not care to pay the salary for an A1 man; second a great many when buying a car are led to believe that the simplicity and superior quality of the car render the services of a mechanic superfluous, and a cheap man will do, or none at all. I have had this told to me at the show by a demonstrator of a car costing $3,000, but whose firm is not building any more. Then there are schools wherein men and boys are taught to become operators, who when turned out are nothing but an expense to the owner, and usually succeed in giving the car they operate a black eye. I have in mind particularly one instance, where a young fellow of 20 learned to operate, and after running a four cylinder car several months, broke his crank shaft. He told his employer that it was due to the poor quality of the crank, when in reality it was due to loose brasses, of which he didn't know anything, but of which I learned from a conversation I had with him. I know of garages where a chauffeur who makes his own repairs is not wanted, and if possible they get their "hammer out" for him. There are lots of other things, too numerous to mention. The National Association of Automobile Manufacturers started some time ago to register chauffeurs. I called on them a few days ago, only to find it was a fizzle. When I asked the reason of its failure, I was told it had been free, and no money had been appropriated to meet the expense of looking up the applicants as to their abilities, etc., so it had not met with success.

N. J. W.

Carburetor-Inlet Fitting.

Editor Horseless Age:

Referring to a communication in your issue of October 26 (page 429), I advise "Packard" to try a different carburetor. I



Fitting Carburetor to Engine

had a similar experience with this car, and replaced the original carburetor with a Kingston, and have had practically no trouble since making the change. In applying the carburetor, a special fitting will be necessary, as the engine inlet pipe is not threaded. The simplest way is to use a common 1¼-in. reducing elbow and make a straight connection, as shown in the accompanying sketch. The connection A is fitted tightly into the engine inlet, B, and held in place by a ¼-in. bolt passing directly through the pipe. The other end of A is threaded into the elbow, C, which, in turn, screws into the carburetor at D.

A. E. England.

Engine Spells Continued.

Editor Horseless Age:

In reference to the trouble W. E. has with his engine, it seems to me that the "hissing noise" must be produced by the suction of air into the carbureter and that any variation in the gasoline feed would not affect it; if this is so, we must look for some cause for an interruption in the passage of air or of explosive mixture, or of the exhaust, as the power fails whenever the hissing ceases. As before suggested, this could occur with a single cylinder engine if the exhaust valve failed to close, but it does not seem probable that it could with a four-cylinder engine.

Two possible explanations suggest themselves; one is that if there is an apron under the car, possibly it sometimes blows against the carbureter and shuts off the ingress of air; the other is that there may be something in or about the muffler which occasionally prevents the exhaust from escaping freely.

F. N. B.

Editor Horseless Age:

Dear Sir,—Referring to Mr. W. E.'s spells of weakness in engine, will say I have in use the same make of carburetor that has a wire gauze strain which came with the car, and also have had the same thing happen to me. I found the cause to be that the inlet valves did not open far enough, the end of valve stem having been worn down by constant use, which reduces the lift. I also had trouble and loss of power from not having the plugs properly screwed into place, causing leakage, but my greatest trouble lay in the inlet valves. I made a run of ninety-four miles over hilly roads last Saturday with my machine in 5½ hours, and for the first few miles my car did not work well. Investigation showed I had my connecting rod bearings on crank a trifle too tight, which caused a loss of power and was very annoying, but by loosening one quarter turn on the studs, I was enabled to run the whole distance without a hitch, taking nearly all hills on the high speed.

William H. La Fountain.

Vulcanizing Temperature.

Editor Horseless Age:

In your issue of November 2 I notice the inquiry of J. H. S., as to "what temperature to apply in vulcanizing, and how long to leave it on?" It is my practice to repair injuries to my tire ever since I paid the first bill for having it done, not only to avoid the necessity of sending it away for the purpose, but also on account of the expense which was nearly five dollars, including express charges. By using a small and comparatively inexpensive vulcanizer, which I first saw advertised in your columns, I believe, I find that I can make a smooth and durable job, without removing the tire from the wheel. The time required after the proper temperature is obtained is from 30 to 60 minutes, depending on depth of the cut. The temperature is shown by the thermometer upon the vulcanizer, and I use a temperature of 275 degrees, as per directions. Whether this thermometer accords with the Fahrenheit scale or is arbitrary I have no means of knowing. I find that having acquired the knack of removing and replacing tires and vulcanizing ordinary cuts, my fear of tire trouble has ceased. By carrying a tree strap or sleeve and inner tubes, and when on a long trip an extra casing, I provide against almost any emergency that can arise. The owner of an automobile who acquires an intimate knowledge of its various parts and requirements, and attends to them himself will have little trouble if he has a good machine, and this is as true of the tires as any other part of it. He can save much time, trouble, and expense by doing his own vulcanizing of small cuts both on inner tubes and casings.

F. A. Hooker.

Hayseed Auto Resolutions.

The following resolutions demanding legislation restricting the use of automobiles on the public highways were recently passed by an association of farmers in Wells County, Indiana:

"Whereas, the farmers of this great commonwealth have exclusively established, improved and maintained our public highways for the use of the traveling public; and,

"Whereas, the time has now fully arrived when the use of such highways has become so endangered by the careless and reckless disregard of human life and property rights by the owners and operators of automobiles that we ourselves, as well as our families, are excluded from their use or required to use the same at the peril of our lives, and, believing that wise legislation which will prescribe such limitations and restrictions upon the use of such vehicles as to insure the safety of the traveling public will work no hardship on any one;

"Therefore, Be it resolved that we, as members of the Rock Creek township horse thief detective association, demand the enactment of such laws, both civil and penal, by the next legislature restricting the use of such vehicles on our public highways so as to insure the adequate protection of ourselves and families and the traveling public generally, and we will cast our vote and use our influence for the election of such legislators as will pledge in advance to use their personal efforts to procure such legislation, and we appeal to the farmers generally and to all who believe in the free and untrammeled use of the highways to use all fair and honorable means to procure this end."

Aside from a very meagre discussion of this important subject in the columns of The Guide this is about the only evidence we have had that farmers are taking the matter seriously and are acting upon the suggestions we have made from time to time. This makes us feel as if some of our readers at least were alive to their own interests and were heartily in favor of the stand which we took some months ago regarding such a law. We hope that voters in many other sections of the state will require a similar pledge from their legislators before electing them. It is now only two weeks before election day, not very much time, to be sure; but if farmers will unitedly demand that such a law be enacted by the next legislature the chances are they will get what they want. Why not act in the matter before it is too late?

Farmer's Guide, of Huntington, Ind., Oct. 29, 1904.

Test Case of Ferry Law.

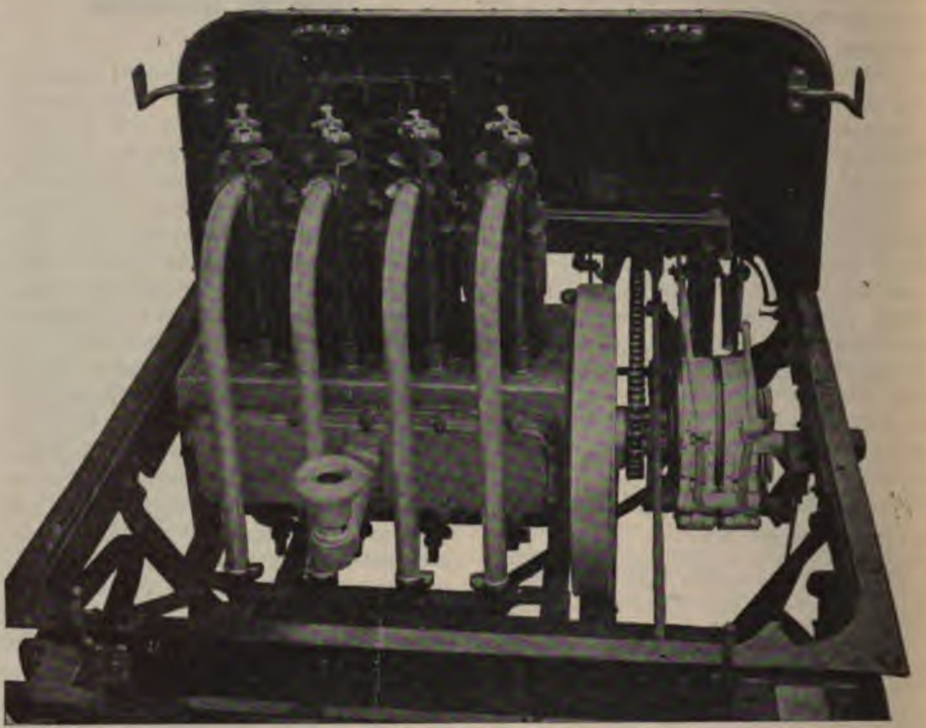
An action has been brought in the U. S. District Court of New York by U. S. Attorney Henry L. Burnett in the name of the United States of America to establish the legality of the law which requires that all fire or electric igniters on automobiles must be extinguished or cut off before they pass upon a ferryboat.

A libel has been filed against the ferryboat Texas, which is owned and operated by the Brooklyn Ferry Co. between Manhattan and Brooklyn, for a violation of the law said to have occurred on October 14th. It is acknowledged by the ferry company that the automobile ran aboard the boat under its own power in violation of the law, and that the fire, as it is called by law, was again started before it left the boat. Sec. 4499 of the U. S. Revised Statutes says: "If any vessels propelled in whole or in part by steam be navigated without complying with the terms of this title the owner shall be liable to the United States for each offence, one-half for the use of the informer, for which sum the vessel so navigated shall be liable, and may be seized and proceeded against by way of libel in any district court of the United States having jurisdiction of the offence. The penalty is $500 for each offence."

New Vehicles and Parts

The New Marion Car.

A new side entrance tonneau model of the Marion Motor Car Co., of Indianapolis, Ind., has recently arrived at the salesroom of the company's New York agents, Homan & Schultz, 134 West Thirty-eighth street, where we were given an opportunity to inspect the machine one day last week. The photographs herewith give a good idea of both the general lines of the body construction and also of the propelling mechanism. The former is of the side entrance tonneau type, and in order to make room for the doors to the rear seat the wheel base of the chassis has been lengthened to 96 inches. The main frame is of armored wood, the side members being two by three inches in section. It is carried upon four full elliptical springs in which a set of idle leaves are provided in the lower parts which are of stiffer stock than the active leaves and considerably shorter radius. Their purpose is to receive the severe shocks of travel and to afford reserve strength for extra heavy loads. The springs rest upon a tubular axle in front and upon a solid axle of square section in the rear. The wheels are of the artillery type, 30 inches in diameter, and are shod with 3½ tires.

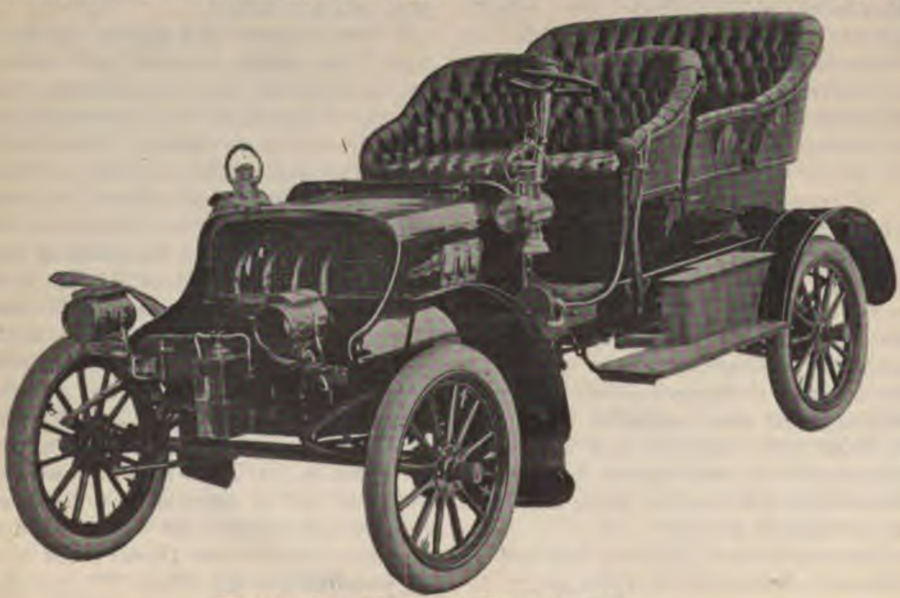


POWER MECHANISM OF MARION TOURING CAR.

The motive power, as can be seen from the photograph of the mechanism, is supplied by a four-cylinder air-cooled engine, which is placed transversely of the frame in front. The cylinders are of steel and are finnished all over. They have a bore and stroke of four inches. On each cylinder twelve flanges are formed which are one-eighth of an inch wide by three-sixteenth inch deep. On top of each cylinder a cast-iron head is secured which is well ribbed and fitted with a dome for the exhaust valves. The two parts of the complete cylinder are held together and the whole is secured to the crank case by four long bolts which pass through lugs on the cylinder heads and into the top of the case.

The admission valves are mechanically operated and seat in ports formed in the heads at the rear of the motor. They are placed with the valve stems pointing downward and are opened by a series of cams on a half-time shaft in the crank case in the usual manner. The gases are conducted to the valves from the carburetor through a single pipe which is jointed at the middle point of a cast chamber of square section which runs across all four cylinders and is secured to each by bolts.

The exhaust valves, as has been said, operate in domes formed in the top of the cylinder heads. The valve stems, of course, point upward and the valves are opened by the downward pressure of rocker arms which are pivoted in lugs cast on to the heads. These arms are operated by adjustable vertical rods which extend down to the plungers which rest upon the cams on the half-time shaft. The seats for the exhaust valves are formed in cages, which are so made that they can be removed from the domes by loosening four screws. The crank case is of aluminum and encloses both cam shafts and the half-time gears. It provides intermediate bearings for the crank shaft.



MARION SIDE ENTRANCE TONNEAU CAR.

The jump spark system of ignition is fitted, employing dry batteries and vibrator coils, a separate coil being supplied for each cylinder. The commutator for the primary circuit is located at the rear of the motor and is operated from the admission valve cam shaft by a pair of bevel gears. The spark plugs screw into the top of the cylinder head above the admission valves.

The carburetor is of the float-feed type. A throttle valve is fitted between it and the admission pipe by means of which, as well as by the variation of the time of the spark, the speed of the motor is controlled.

The motor is lubricated by the splash method. A pipe of comparatively large diameter runs from the centre of the crank case and is fitted at the outer end with a funnel-shaped casting. Through this the oil is poured. The outer edge of this funnel-shaped piece is curved inwardly so that the oil which is thrown out through the pipe by the pressure in the crank case is caught and runs back through the pipe.

The motive power equipment, including engine and transmission group, is carried

on a sub-frame constructed of angle iron and suspended from the side members of the main frame. The change gear group provides two forward speeds and a reverse. The low speed and the reverse motion are obtained from systems of planetary gears which are brought into action by foot pedals which tighten external bands about their containing drums. The high speed is obtained by means of a large diameter, leather faced cone clutch, which engages with the flywheel. This clutch is controlled by a lever at the side of the operator's seat, which works across a notched segment. When this lever is in a vertical position the clutch is disengaged; when it is moved forward the frictional surfaces are brought together by the main clutch spring, which is spiral in form and is wound about the driving shaft.

From the main driving shaft the propelling power is transmitted by a chain to a counter shaft located about midway between the axles. This counter shaft is supported in a rectangular frame constructed of angle iron, which is hung at the corners, in bracket pieces attached to the main frame. The differential is of the spur gear type and is supported by bearings at each side. From the counter shaft the drive is delivered to the rear wheels by side chains.

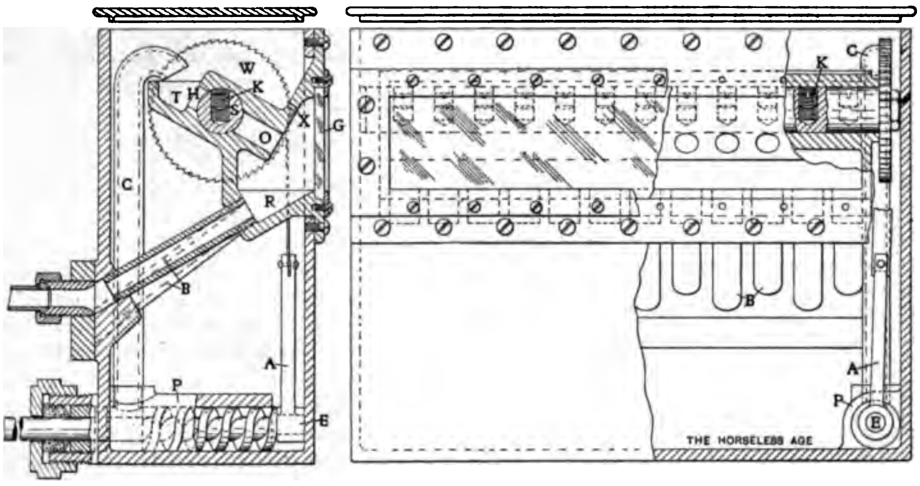
With this system of transmission it is necessary, of course, to provide a means of adjustment for both the side chains and the chain from the motor shaft to the differential. The former adjustment is made by varying the lengths of the distance rods from the rear axle to the frame, the rear springs being pivoted at the top to make this possible. To tighten the other chain, the frame in which the countershaft runs is moved toward the rear of the car in slots formed in the hangers. The frame is held in position by four bolts.

Two means of braking are fitted to the car, one being a band brake of the double-acting type which is pedal-controlled and acts upon a drum around the differential, and the other consisting of a pair of internal brakes located on the hubs of the rear wheels, which are operated by a backward movement of the handle at the side of the car referred to above. By combining the operation of the high-speed clutch and the emergency brakes in this one lever it is impossible to apply the brakes without first disengaging the clutch.

Steering is effected by a hand wheel which moves a pair of bevel gears. The operator's seat is located at the left of the vehicle, which, although by no means new, is a variation from the general practice of the day.

The Radcliffe Rotary Mutliple Oiler.

The mechanically operated multiple feed oiler herewith illustrated has recently been brought out by C. R. Radcliffe, of 2131 Broadway, New York City. The apparatus is of strikingly novel design and embodies many interesting features. The vertical section through one of the units shown in the illustration will serve to describe the principle involved by, and the action of the various parts.



THE RADCLIFFE ROTARY MULTIPLE OILER.

At the bottom of the reservoir which is formed by the containing case, an Archimedean screw pump P is located, which is operated by a spring belt, chains or other means from the half time shaft of the motor and runs at an equal speed with it. The oil is drawn into the forward end of this pump, is forced up through the pipe C and is delivered by it into the trough T, which runs across the entire width of the oiler. In the forward side of this trough is a row of holes, H, three-eighths of an inch in diameter and equal in number to the pipes which run from the oiler to the bearing. The shaft S also runs across the oiler and is so placed that its longitudinal center line passes through the centers of the holes H. In this shaft are a series of tapped holes equal in diameter and number to the holes in the wall of the trough. A headless screw is run into each of these until its top is below the outside surface of the shaft, and a small pocket is thereby formed. The shaft revolves during the operation of the lubrication, and as this small pocket comes opposite the hole H, a quantity of oil runs into it by gravity and is carried around by the shaft until the pocket comes opposite the opening O. It then runs out by gravity and drips down into a second trough R, which is divided into compartments, one for each outlet pipe. The glass plate G serves the purpose of a sight-feed, allowing the oil to be seen as it drips into the second trough. From this point the oil runs down through the tubes B to the pipes which conduct it to the various bearings. The lower ends of the tubes B are "staggered" in order to secure sufficient room for the unions which connect the outlet pipes to the oiler.

The rotation of the shaft S is accomplished by means of a rachet wheel W which is secured to it at one end, and with which a spring pawl A engages. The pawl obtains its upward and downward movement from an eccentric, E, attached to the end of the pump shaft. This construction is shown clearly in the figure. As the pawl moves up, the rachet wheel is moved through a certain number of degrees in a direction opposite to that of the hands of a watch, and while the pawl moves down it remains stationary. This pause, as it were, affords opportunity for the oil to run into and out of the pockets in the shaft S. The gearing is such that the pump shaft makes one hundred revolutions to one of the wheel W, which for an engine speed of 1,000 r. p. m. would give to the shaft S a speed of only five r. p. m.

The amount of oil fed over at each revolution of the shaft is variable. The adjustment is made by increasing or decreasing the depth to which the headless screws K are sunk into the shaft. This is accomplished by removing the glass front piece G by loosening from clips which hold it in place and inserting a screwdriver through the opening so formed, up through the tube O. It might be mentioned that the device can be effectively cleaned in a similar manner.

In order to keep the oil from thickening in cold weather, a small quantity of exhaust gas is led into the interior of the oiler through a small pipe tapped into the wall of the exhaust pipe. The main chamber of the oil reservoir is placed in communication with the sight-feed trough through the small holes X, so that the same pressure obtains in the sight-feed compartment as in the main reservoir and the exhaust pressure is used not only for warming the oil but also for adding gravity in forcing it through the oil tubes to the places to be lubricated. If any of the tubes should accidentally get stopped up, it is a comparatively easy matter to take off the plate over the sight-feed chamber, insert the nozzle of an air pump into the end of the tube and force the obstruction through. The whole device is unusually simple and compact. The oiler in the cut has 12 independent feeds, every one of which can be separately adjusted or entirely cut off.

The New Winton Models.

The Winton Company's product for 1905 comprises four different models, viz., one 16 h. p., one 24 h. p., and two 40 h. p. All have four-cylinder, vertical, water-cooled motors, arranged in front; separate-clutch transmission gears and side entrance tonneau bodies. The 16 h. p. engine is of 3½ inches bore and 5 inches stroke; the 24 h. p. of 4⅜ inches bore and 5 inches stroke, and the 40 h. p. of 5¼ inches bore and 6 inches stroke. The cylinders are cast in pairs, with heads, water jackets and exhaust valve chambers integral. The cylinder castings are bolted to an aluminum crank case, which is split vertically, and of which one-half can be removed to allow taking out the crank shaft, pistons and connecting rods without taking off the cylinders. All the cam shaft gears are enclosed dust-proof, and to insure further protection of the mechanism a permanent dust pan is secured underneath the frame.

All four cylinders are supplied by a single carburetor provided with a jacket through which the warm cooling water from the motor circulates. From the main gasoline tank the gasoline is fed by pressure to an auxiliary tank immediately above the carburetor, and from the auxiliary tank it is fed to the float chamber of the carburetor by gravity. The ignition is on the high tension magneto system, no batteries being used even for starting. The magneto operates a single non-vibrator coil and carries a high tension distributor for connecting the secondary winding of the coil successively to the spark plugs in the different cylinders. The spark advance lever is secured to the steering column, on top of the steering wheel. The motor is lubricated by what is referred to as a roller feed lubricator, which is claimed to supply lubricant in exact proportion to the motor's speed, and regardless of temperature and viscosity of the oil. This oiler supplies all the wearing surfaces of the motor, as well as the bearings of the rear axle. It is attached directly to the motor and extends through the dash, so that it is constantly under the observation of the driver. The change speed gear is lubricated by means of splash.

Water circulation is effected by a gear-driven centrifugal pump, and the heat of the cooling water is dissipated in a radiator comprising vertical flanged tubes and located at the front of the bonnet. Air is drawn through the radiator by means of a positively gear-driven fan located directly back of it. Besides, the flywheel arms or spokes are cast to act the part of a fan, and further increase the air circulation. The bonnet fan is surrounded by an airtight casing, so that the whole volume of air moved by it must pass through the radiator. The speed of the motor is controlled by the Winton pneumatic control system, by means of a lever on top of the steering wheel, or by means of a spring button under the driver's right foot.

The change speed gear is of the Winton separate clutch system, giving two forward speeds and one reverse. The clutches all consist of one conical and one flat-faced member which act upon a bronze member. On the high speed the gearing in the change gear box is running idle, the transmission being then direct. The change gear box is located under the footboard, and is therefore exceptionally accessible. A flexible coupling is placed between it and the motor. The rear axle runs entirely on roller bearings, and carries a spur differential gear. The wheels are securely keyed to the end of the axle. A single ball joint strut or torsion brace limits the axle movement and absorbs braking and driving strains. The steering is accomplished by means of a screw and nut arrangement through an inclined hand wheel. The spark and throttle levers are located on top of the steering wheel, and operate in spiral cams located in the steering tube. Two entirely separate braking systems are provided—a band brake on the driving shaft which is operated by a forward movement of the high speed lever; and a pair of hub brakes which act directly on the driving wheels and are operated by a pedal.

The cars all have frames with side members of one-piece channel-section pressed steel, and no sub-frame. The motor and transmission case are carried on malleable drop frames. The body is of the side entrance tonneau type, seating five passengers. It has aluminum body panels and laminated wood seats. The front seat is divided. The upholstery, trimmings and finish are claimed to be of high quality. The body is supported on the frame by means of variable strength springs providing easy riding qualities both when the car carries a full complement of passengers, or only one or two. A double spring of six leaves is so shackled that only three leaves are engaged when one or two passengers are carried, while six leaves are engaged when a full load is carried. The size of wheels and tires, as well as the capacity of tanks and the wheel base, varies, of course, with the different models.

The G & J Thread Fabric Tire.

In the construction of their new type of clincher tire the G & J Tire Co. make use of a so-called thread fabric which is woven in the manner illustrated in Fig. 1 herewith. The fabric consists merely of a number of parallel threads which are, of course, very strong, between which are woven cross threads at a considerable distance apart. The method of building up the tire is shown in Fig. 2. The fabric is imbedded in the rubber in the usual way, but the thread runs diagonally of the tread, each layer running at right angles with the one beneath.

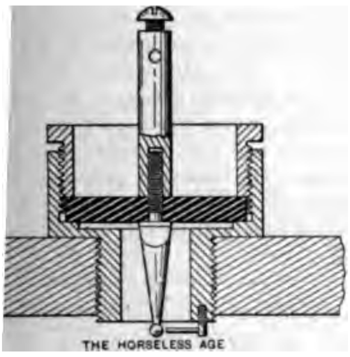
It is claimed by the makers that owing to the fact that each individual thread is covered with a coating of rubber, there can be no cutting of one by another under the action of the tire, that it is possible with this construction to obtain an exactly equal tension on each thread, and consequently a more uniform strength throughout the structure of the shoe, and that, further than this, a tire so made is more pliable and not so apt to heat as is one in which the so-called square woven fabric is used. It is also pointed out that with the old construction the whole fabric is exposed to the rotting influences of water which may work in through surface cuts as it is drawn through it by capillary attraction, whereas with the new fabric each thread is insulated, as it were, by a coating of rubber.

Fig. 1.

Fig. 2.

A New Spark Plug.

ner novel form of spark plug has been brought out, in which the pos- trode, instead of being carried tube of insulating material, is sup- y a circular disc of such material. ly of the plug is enlarged outside nder walls to receive the insulator. nsists of a circular disc of suitable fitting loosely into the plug and

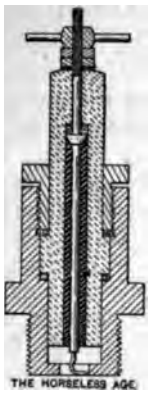


WISNER'S SPARK PLUG.

n place by a packing ring or gland. sulated terminal is in two parts, as in the cut; the lower, or sparking passes through the insulator and is ed into the upper part, which forms nding post. A noticeable feature of vice is the shape and position of the tor which permits of its expanding lerably without danger of breakage. lug is the invention of C. H. Wisner, nt, Mich.

The "Micapor" Spark Plug.

the "Micapor" spark plug, just placed e market by William Roche, of New , the special feature of interest is the od of insulation. The high fire resist- of porcelain and the good qualities of as an electrical insulator are utilized combination of the two. The porcelain



THE "MICAPOR" SPARK PLUG.

ator proper, which is of rather conven- l form externally, is recessed internally dmit of a reinforcement consisting of be of sheet mica, which is cemented it. The core, which is of steel with a num point at the inner end, is shoul- d so that it may be drawn firmly against the end of this recess by two nuts which bear against the center end of the insulator. The outer shell or body of the plug is counterbored to receive a shoulder on the insulator, which is held in position by a brass gland screwed into the shell. The inner end of the plug is partly closed by an inward flange on the wall, forming a pocket to aid in the ignition of the gases. All joints are carefully packed with asbestos gaskets laid in cement.

A. L. A. M. Meeting.

At a meeting of the Association of Licensed Automobile Manufacturers, held on Wednesday, November 2, at the association's headquarters in New York, the following officers were elected: President, Charles Clifton, Buffalo; vice-president, William Metzger, Detroit; secretary, L. H. Kitredge, Cleveland; treasurer, H. H. Franklin, Syracuse. Executive committee: Charles Clifton, E. H. Cutler, F. Z. Smith, S. T. Davis, M. J. Budlong.

The handbook committee reported the present edition nearly exhausted and the demand very great. The second edition, containing the 1905 types of car, is already much in requisition.

The executive committee reported that among the importers of unlicensed cars several are now importing through licensed importers, and that three or four have settled the matter by taking out licenses for their individual machines, while others are at present negotiating to secure the same privilege. A report on the litigation over the Selden patent was presented. During the last two months 1,450 pages of testimony have been taken in the main test case. Several hundred pages of testimony have been taken on the other infringement suits.

Great volume of material has been accumulated in depositions on the Steering Gear Mechanism patent, and the case is now ready for the testimony.

The new board of officers met directly after the meeting and organized for the coming year.

N. A. A. M. Meeting.

At a meeting of the directors of the National Association of Automobile Manufacturers, held last Wednesday at 7 East Forty-second street, New York, the matter of the association taking decisive action with regard to the legality of the licensing of cars was considered at some length. It was decided to postpone definite action until a later meeting, when the matter will be taken up with counsel present. Aside from this, only routine business was considered.

The Whiting Foundry and Equipment Co. are building a number of 3-ton gasoline trucks in addition to the 5-ton model described in our columns some time ago.

MAINTENANCE AND REPAIRS

[Suitable contributions to this department, accompanied by sketches, are solicited and will be well paid for.]

Removing a Broken Stud Bolt.

BY DR. DANIEL LONGAKER.

The writer would hardly deem a description of this simple operation necessary, had he not recently witnessed a clumpsy, laborious and destructive effort to remove a broken stud from its bed in the main shaft bearing of the runabout engine. This misdirected work consumed many hours, putting the owner of the machine to needless expense and spoiling the thread in the bearing into which the stud was screwed. This finally had to be tapped for a larger stud. Altogether it was a bad job.

The work was done in one of the smaller garages where automobiles are stored and repaired, and by a man who graduated into it from bicycledom. Having repeatedly observed the progress of this herculean task, it is needless to say I was alarmed when my own machine broke off the corresponding bolt a few days later. Had I been compelled to employ this same mechanic I should have felt like giving up. But I was assured by the young man to whom I entrusted this particular job that the removal of the broken piece would be the work of only about fifteen minutes, and that it would be easy at that.

Centering a ¼ inch drill against the broken end, a hole was drilled to the depth of ⅝ inch, and into this hole was firmly driven a short square piece of steel projecting above the level of the bearing in such a manner that its end could be grasped by a wrench, and the broken end of the stud unscrewed. The thread of the shaft bearing was not touched or injured at all, and it was ready to receive the new stud. The work required about as much time as its description—not over fifteen minutes. The broken stud is illustrated herewith, showing plainly the method employed.

STUB OF STUD.

It is noteworthy that my repairman in this instance is a graduate of one of the manual training schools, who has had the additional advantage of a training in one of the largest garages in the city, and in a locomobile works. Finally, the contrast in the manner of doing this simple piece of work was no greater, perhaps, than is the character of these two young men. One derived satisfaction and pleasure from it, and the other found it a disagreeable and irksome task which he frequently interspersed with "cuss words."

OUR FOREIGN EXCHANGES

Motor 'Bus Lines in Italy.

A company has been formed to work the "diligence" service in Middle and Southern Italy by motor vehicles in place of the horsed vehicles at present in use. The Italian Government and municipal authorities have given their support and assistance to the motor service in a most practical manner. The roads to be traversed present unusual difficulties, but where awkward corners exist means will be taken to render them easy to negotiate; roads will be widened where necessary, and in some cases bridges will be built across ravines. The Motor Transport Company will enjoy the same privileges as the Italian railway companies: there will be fixed stopping places, where only the passenger vehicles will stop to take up or set down. The municipal authorities of each city have agreed to furnish a station, with waiting-room. The railway companies are favorably disposed to the new service as they will benefit by the tapping of districts hitherto untouched by railways. The first route will be opened on January 1, and other routes as quickly as the vehicles can be manufactured.

The Chateau-Thierry Hill Climbing Contest.

The annual hill-climbing contest on the Chateau-Thierry hill in France was this year held on Sunday, October 23d. Owing to to the dangers involved in driving huge racing machines up such a grade as this, the racing category was this year entirely excluded from the program, and only touring vehicles took part. A hill-climbing contest for racing cars had, moreover, been arranged to be held a week later on the Gaillon hill. In order that makers could not possibly enter racers in disguise as touring vehicles, some very strict rules were observed. Every entrant was required to submit to the organizers, upon the entry of his machine, a statement from the manufacturer thereof, giving the shop number of the engine, and the bore and stroke, and confirming it to be a stock machine in all respects. In the statement the manufacturer also agreed to supply duplicates of the car entered at the price mentioned in the entry blank. Another rule was to the effect that the bodies of the vehicles should be of such a character that their cost might bear a proper relation to the cost of the châssis.

A total of seventy-four entries were received, and out of these sixty-three actually started, and with very few exceptions all covered the mile course in less than five minutes from a standing start. The course up the Chateau-Thierry hill is an exceptionally difficult one, the gradient at the starting point being 5 per cent. and increasing at intervals until it reaches 10 per cent. near the finish line.

The event was favored with fine weather, and notwithstanding that in view of the fact that racing cars were barred, no sensational speeds could be expected, a large crowd of spectators had gathered along the course. Before the start of the hill-climbing competition, a sort of appearance competition was arranged by a special committee to judge the adaptability of the cars in the different classes to touring purposes. The jury in this competition made the following classification after the hill-climbing, taking due account of the achievements of the machines in the climbing contest:

Motor-bicycles, Le Metais (Neck arsulan); cars under $800, Bailleau (Bailleau); cars between $800 and $1,600, Laharague (Boyer); cars between $1,600 and $2,400, Borde (Aries); cars between $2,400 and $3,600, Durand (Radia); cars between $3,600 and $5,000, Rulot (Gardner-Serpollet); cars over $5,000, De Lorentie (Mercedes).

The best showing in the hill climb was made by the Gardner-Serpollet steam cars, these winning in four classes, viz.—for cars from $800 to $1,600, cars from $1,600 to $2,400, cars from $2,400 to $3,600, and cars from $3,600 to $5,000. The winner in the motorcycle class was Magoli, on a Coulomb; in the class for cars under $800, Barreaux, on a Bolide, and in the class for closed cars, Barthelemy, on a Berliet.

A Coventry firm has just introduced a new motor carrier for tradesmen. It is something like a tri-car or fore-carriage, to which it can be easily converted for pleasure purposes, but has a large wickerwork carriage body of large capacity in front. It is fitted with all latest improvements, 3½ h. p. water-cooled engine, free engine clutch, and has three brakes. The length over all is 8 feet 6 inches and width 4 feet. The price is most reasonable at £75, and it should appeal to up-to-date tradesmen who require economical and rapid delivery of goods, and also travellers in small goods who wish to get quickly about suburban districts.

A method has been invented in England for plating on aluminum, an achievement which has long been striven for with little success. The chief difficulty appears to rise from an invisible film which forms on aluminum when exposed to air. By the new method this film is dissolved off in a bath containing soluble fluorides. A little free hydrofluoric acid appears to work best. Then a coating of zinc is formed on the aluminum in a plating bath, and upon this coating copper, silver, and other metals may be deposited. In order to form a gold plating the zinc covering the aluminum must first be coated thinly with copper, as otherwise the gold sinks into the zinc, and in a few weeks almost disappears.

The new road engineer at Sarur, India, uses an automobile for inspection purposes, much to the chagrin of contractors and sub-overseers, who find that he comes around oftener and more unexpectedly than formerly.

A new and important application of motoring has been realized by the Congo Free State authorities. After long and complicated trials they have finally adopted a special type of van or cart which will serve well for conveying goods in the African countries. The cart weighs about one ton and can convey easily a similar weight across the worst roads. Trials were made on sandy and muddy roads with complete success. The motor is propelled by steam and allows of heating by wood. A number of these cars will be sent out to the Congo soon.

Two classes of precautions are necessary in the storage of gasoline, viz., those for guarding against ignition and those for limiting the effects of a fire. In the industrial use of gasoline the employment of naked lights, either in the building or in any position outside the building to which a stream of vapor could travel, should be prohibited. To give the light occasionally needed in stores a lamp constructed on the miner's safety lamp principle might be carried, but rooms in which gasoline is used should be lighted by incandescent electric light, special care being taken with the wiring.

The possibilities of gas turbines formed the subject of an address delivered last Friday by R. M. Neilson, of Manchester, England, at the Institute of Mechanical Engineers. Mr. Neilson said that of late the prophecy had been heard that turbine driven by hot gases, other than steam, would eventually come to the front as prime movers. Such a turbine would be largely bought by motor-car companies, and if it could be set down, like an electric motor, in factories to drive the machinery, it would have a great future before it.

An English contemporary states that owing to the eddies and back currents of air which swirl and circle round them, back lights are notoriously difficult to keep burning, so that it is safer on the whole to carry an electric light at the rear. This necessitates the portage of an additional set of accumulators. As there is nothing certain under the sun, the electric light is not altogether a sure protection, but it cannot be blown out, and if attention is given to the proper charging of the accumulators and the connections to the lamp, one is safer therewith than the oil. Six two-volt accumulators will provide ample current for such a lamp, and if space within the body is valuable they can be carried in a case slung from the other side of the frame. The wires should be kept as short as possible,

but with enough slack to avoid rubbing and stress.

The latest Royal convert to automobilism is His Majesty Ton-Tai, of Annam. But a few weeks ago and Ton-Tai lolled in all the indolence of the luxurious East—bejeweled, be-curtained, and scarce knowing the experience of personal physical exertion. But two weeks ago he made his first drive, and in costume correct even to the goggles. A little diplomacy was used as to speed, and to obviate picturesquely oriental details as to high treason for sitting beside the emperor, the chauffeur, who is also chief eunuch, had been trained to keep a seat on the footboard.

The 1905 line of De Dion & Bouton will comprise the 6-h. p. "Populaire," an 8-h. p. single-cylinder, 10- and 12-h. p. double-cylinder and a 15-h. p. four-cylinder cars. The "Populaire" will retain the De Dion separate clutch change gear, but all the other models will have sliding pinion change gears.

On October 27 last a debate was held at the A. C. G. B. and I. on the proposition, "That the club should not allow or permit others to allow, high-speed cars to be entered for any competition in this country, whether it be on the track or the public road." The affirmative side was taken by Claude Johnson and the negative by Charles Jarrott.

Work of The Wilkesbarre Automobile Club.

This club has been making an effort recently to secure equal privileges on the boulevard to Bear Creek with other users of the road. A delegation was sent out to try to pass the tool-keeper prior to making a test case in the matter. The keeper met them with a gun and announced that the owners of the road had issued orders to the effect that anyone found driving an automobile on it should be shot. The club will take legal action in the matter.

New Trebert Engine.

The Trebert Gas Engine Co., of Rochester, N. Y., have added to their line an engine having two horizontal opposed cylinders. Its over-all dimensions are 33 x 25⅛ x 16½ inches. The cylinders have a bore of 5 inches and the stroke is of the same length. Mechanically operated valves are fitted and the half-time gears and valve cams are enclosed in the crank case. The valve stem bearings are bushed with phosphor bronze and carry stuffing boxes through which the valve stems work. The flywheel is fitted with fan blade spokes. The motor complete weighs about 250 pounds and is rated at 15 h. p.

The Louisville (Ky.) Lighting Co. has ordered a 2-cylinder Knox car for line inspection work and to answer fire calls.

LEGISLATIVE AND LEGAL.

Identification Bureau for Automobilists Using San Francisco Parks.

San Francisco, Cal.—The Park Commissioners have established an identification bureau for all automobilists allowed the privileges of the park. Persons desiring licenses must sign their names to the permit issued and also furnish a photograph of himself or herself, which is to be pasted on the back of the permit. All persons operating cars must carry their permit with them and produce the same on demand of the police for identification as to their right to use the park drives. All holders of permits have been requested to call at the office of the commission, bringing photographs with them. The police are instructed to stop all cars for the next thirty days to see that the operators have complied with the new regulation. The commission maintain, in defence of their action, that it is made necessary by the practice indulged in by certain automobilists of loaning their permits, or of claiming when stopped that they had left them at home.

Examination of Operators in Louisville, Kentucky.

Louisville, Ky.—Motorists are making plans for a mass meeting to be held soon to take action regarding the ordinance which was introduced recently in the Board of Aldermen. The bill provides for the customary registering and numbering of cars and also for the examination of operators by a commission composed of the electric inspector, health officer and city engineer. No applicant is to be granted a license to operate a car if he is addicted to strong drink, has defective eyesight or hearing, or is of reckless or violent disposition. The speed limit is fixed at six miles an hour for the business portion of the city and ten miles in the sparsely settled districts.

Hearing on Proposed Vermont Law.

Montpelier, Vt.—A hearing was granted recently to the automobilists of the State on a proposed automobile law. The registration, licensing, speed regulations, etc., provided in the bill seemed to be approved by the majority, but Section 14 was a source of discussion, and drew forth many ideas as to its purport and validity. The section reads: "Nothing herein contained shall be construed as to affect the rights of boards of aldermen of cities, selectmen of towns, or trustees or bailiffs of incorporated village to make special regulations as to the speed of automobiles and motor vehicles, and as to the use of such vehicle upon particular roads or ways, including the right to exclude them altogether therefrom. Such exclusion, however, shall be subject to an appeal to the Secretary of State, whose decision in the case shall be final. No such special regulation shall be effective until notice of the same is "posted conspicuously at the points where any road affected thereby joins other roads." It is probable that the committee in charge will reconsider this section.

Nashville, Tenn.—The new ordinance is now in force, and automobile owners have been notified to register their cars in compliance with it.

Colorado Springs, Colo.—W. H. Harrington, of Philadelphia, has been fined $100 and costs for exceeding the speed limit on Colorado avenue.

San Antonio, Tex.—Chief of Police Irvin has issued orders to the force to strictly enforce the laws against scorching. It is said that this evil has become prevalent in Breckenridge Park of late.

Philadelphia, Pa.—Eli H. Darnell and wife have been awarded $3,600 damages against Adolph Krouse for injuries sustained when the latter's car collided with a wagon containing the plaintiffs.

Des Moines, Ia.—The property owners along Grand avenue are up in arms against automobilists whose cars drip oil on the asphalt pavement. They contemplate asking for an ordinance which will require automobiles to carry drip pans.

Boston, Mass.—The State Highway Commissioners have been asked by the authorities of Wexham to revoke the automobile license of T. McK. Cook, of Allegheny, Pa., because of two convictions for fast driving, in which his cars were concerned.

Peoria, Ill.—The first suit to be brought before the Peoria County Court for damages for personal injuries resulting from the frightening of a horse by an automobile, is that of Aaron Libey against Walter L. Wiley. The plaintiff asks for a balm of $5,000.

Chicago Ill.—Justice Martin has awarded damages amounting to $1,122 to A. L. Johns against Peter Palmer, Jr., whose car, driven by his chauffeur, collided with and wrecked a carriage owned by the plaintiff.

$40,000 damages are asked by Samuel S. Hubbard in a suit brought against William H. Brown, of Evanston. Hubbard claims to have been struck and knocked down on October 19 by a car driven by the defendant. It is claimed that he has been confined to his bed since the accident and that his recovery is doubtful.

New Brunswick, N. J.—James K. Diel, of Old Bridge, has brought suit against W. F. Prince, of Elizabeth, N. J., to recover $2,500 damages for injuries to himself and wife, alleged to have been received when

the plaintiff's horse was frightened by the defendant's motor car.

West Chester, Pa.—At a recent meeting of Borough Council an ordinance was passed requiring all residents of the town operating automobiles to pay for an annual license. Because of the failure of the automobilists to comply with the ordinance Burgess Pennypacker has issued a notice that if the license dues are not paid at once "prompt measures will be taken to collect same." The motorists claim that a State license is all they can be compelled to pay.

Commercial Vehicle Notes.

It is proposed to establish an automobile "Sight Seeing" line in Tacoma, Wash.

The Olds Motor Works write us that their track inspection cars were awarded a gold medal at the St. Louis Fair.

The St. Louis (Mo.) Automobile Service Co., recently incorporated, propose to do a messenger, parcel delivery and renting business.

"The automobile has become a political issue. It must be regulated," declares the Atlanta *Constitution*. In that case it is a political machine and political machines are hard to regulate.—*Clipping.*

The Knox Automobile Co. has recently delivered to the United Electric Light Co., of Springfield, Mass., two emergency wagons fitted with tool compartments and space for carrying repair materials. Each car is equipped with a swinging searchlight.

The automobile 'bus line between Etna and De Haven, Pa., which has been in operation for nearly three months, has been discontinued, owing, it is said, to the tearing up of the Butler plank road between the points mentioned.

In the case of Thomas Byrne against the Bradley & Johnson Co., of New York city, the city marshal has ruled that automobiles used for public hire are subject to the laws governing the rates for hack charges. He accordingly ordered the defendant to return enough of the amount collected to make the rate $1 per hour.

The police commissioners of Boston granted a hearing on November 2 to the cab owners and automobile dealers on the subject of licensing automobiles which are rented out, and of regulating the rates to be charged according to the law governing the charges for cabs. The authority of the board in the matter was questioned by one of the speakers for the automobile dealers. The board took the matter under consideration.

U. OF P. A. C.

Fifteen cars were driven in the first run of the club during the present college year. The party went to the King of Prussia and back by the way of the Lancaster pike. A stop was made on the return at the Merion Cricket Club for refreshment.

Club Notes

A. C. A. Clubhouse Plans—Candidates for Election.

At a meeting of the board of governors of the Automobile Club of America, held on Thursday afternoon, November 3, a committee was appointed to consider the choice of location and construction of a suitable clubhouse and thoroughly equipped garage in this city. The matter has been placed entirely at the discretion of this committee, which consists of Messrs. L. R. Shattuck, chairman; Jefferson Seligman, Col. John Jacob Astor, William K. Vanderbilt, Jr., Arthur Iselin and Harlan W. Whipple.

The report of the nominating committee was accepted, and the following ticket announced: For president, Dave H. Morris; first vice-president, Colgate Hoyt; second vice-president, William K. Vanderbilt, Jr.; third vice-president, C. G. Dinsmore; treasurer, Samuel H. Valentine; three governors to serve for three years, James L. Breeze, Melville D. Chapman and Harlan W. Whipple.

In response to the complaint of the club in regard to the failure of locomotive engineers to signal their approach to grade crossings, as required by law, communications were reported from the Long Island, Erie, New York Central, Pennsylvania, Lehigh Valley, New York, Ontario and Western, and other railroads, stating that special instructions had been issued to engine drivers and that the law will be complied with.

An investigation made by the club has shown that but a very small percentage of villages in this and adjoining States have any ordinance requiring the carrying of lights by horse-drawn vehicles, and in the few cases where such ordinances are on the village books they are practically a dead letter. The club purposes to have a State law passed requiring all horse-drawn vehicles in every town and village of the State to carry the necessary lights.

The following active members were elected: E. Shriver Reese, president of the Automobile Club of Cleveland; Samuel Untermyer and Clifford M. Bouggy, of New York.

BUFFALO A. C.

At a meeting of the Membership Commitete on November 1, twenty-three applications for membership were favorably acted upon.

AURORA (N. Y.) A. C.

A club run was held last week to Elgin, where a supper was served. The run home was made by moonlight. About thirty persons participated.

PITTSBURG A. C.

At its last meeting the club voted to affiliate with the A. A. A.. W. C. Temple has been appointed a member of the Board of Directors of that organization.

ROCKFORD (ILL.) A. C.

The club proposes to conduct an automobile show in the Armory Building at some suitable time during the coming winter. The local dealers will be asked to co-operate in the management of the event.

HOUSTON (TEX.) A. C.

The club's Hallowe'en run was marred by frequent stoning by young boys along the streets. The party went to Bray's bayou, where supper was served. About thirty members participated in the outing.

LOUISVILLE (KY.) A. C.

The club sent out notices before its recent run to Lexington warning persons whose horses are not accustomed to automobiles to be on the lookout for them. The route to be followed was given in the notice. About twenty cars took part in the run.

RHODE ISLAND A. C.

An all-night smoker was held on November 8, at which reports of the election were received. A musical program afforded entertainment. The regular monthly meeting of the Board of Governors was held on November 2, at which considerable routine business was transacted.

N. Y. STATE A. A.

A call has been issued for the regular quarterly meeting of the directors in Syracuse on November 19. The applications of several new clubs for membership will be acted upon. A banquet will be held in honor of the visiting automobilists. President Whipple, of the A. A. A. has been invited to attend.

CARBONDALE (PA.) A. C.

A club run was held recently to Great Ben. About twenty-five members and guests left the clubhouse at 8 o'clock in the morning, and proceeded to Susquehanna, where diner was served. From this point the run was continued to Hallstead and Great Bend. Returning, the trip was made by way of Clifford.

COLORADO A. C.

A hill-climbing contest will be held on November 11 to arrange for which a committee, consisting of Messrs. Patterson, Newton, Bergtold and Brown, has been appointed. It is probable that the hill on 15th street, in North Denver, and the road out past Sacred Heart College will be selected for the event.

A. C. OF SOUTHERN CALIFORNIA.

It has been proposed to change the by-laws of the club so that a number of different classes of membership will be provided. The action will be taken with a

view to increasing interest in the club. Steps are being taken to actively press the good roads campaign to be carried on before the Legislature. The park commissioners have offered to set aside a portion of the Ocean Boulevard two and one-half miles long and two hundred feet wide for the exclusive use of automobiles, provided the club will raise $6,000 to pay for the necessary filling in

A. C. A.

On Tuesday evening, November 15, Geo. Donaldson will deliver a lecture at the club on "The Yankees of the East," illustrated with lantern slides. Supper will be served at half-past 10 o'clock. Cards of admission for guests may be had upon application to the club secretary. As the annual meeting of the club takes place on Monday evening, November 21, the club night on Tuesday, the 22d, will be omitted, but will be resumed on each Tuesday thereafter. It is probable that the club will soon take some action regarding slippery asphalt pavements in New York City, and will ask for the abolition of private sprinkling carts.

LONG ISLAND A. C.

The regular weekly meeting was held in the clubhouse, at 360 Cumberland street, Brooklyn, on November 2. Albert Mackay, L. R. Adams and Alfred Wilmarth were appointed a nominating committee to name a ticket for the coming election of officers. Dr. Richardson, Lawrence Abraham and Edwin Melvin were appointed a committee to arrange for the annual dinner which will be held on the evening of the third Wednesday in December. Following the dinner the election of officers for next year will take place. It was decided to install a steam heating plant in the new clubhouse and to provide safety tanks for storing gasoline. The Garage Committee reported that all the storage room in the house had been taken, and that accommodations for ten more machines had been provided in the adjoining building.

Tire Companies Reorganize.

The Goodyear Tire and Rubber Co., of Akron, Ohio, have decided upon a plan for reorganization. The company's note indebtedness is to be taken up by a ten-year, six per cent. first mortgage amounting to $245,500, against which, it is said, the company have assets approximating $800,000. The following officers have been elected for the ensuing year: L. C. Miles, president; Hon. Charles Dick, vice-president; Charles W. Seiberling, secretary; H. B. Manton, treasurer, and F. A. Seiberling, general manager. The above-mentioned, together wtib A. W. Firestone and F. G. Carnahan, comprise the board of directors.

The Fisk Rubber Co., with a capital of $600,000 have been incorporated under the laws of Massachusetts, to succeed the Fisk Rubber Co. of Chicopee Falls, who have been in the hands of a receiver since October, 1903. Harry T. Dunn, manager of the old company, is the new president; Alfred N. Mayo, the assignee, treasurer, and Harry G. Fisk, clerk. It is planned to pay creditors five per cent. in cash and one hundred per cent. in preferred stock in the new company. A new building is being erected as an addition to the plant, which, it is expected, will be ready for occupancy by January 1.

New Incorporations.

Narragansett Motor Co., Washington, D. C. Capital stock, $25,000. Incorporators: H. G. Sheeler, W. S. Clinton, P. H. Kennedy, Isaac Wynne, W. A. Swan.

W. J. Kells Manufacturing Co., Albany, N. Y. To manufacture automobile parts and accessories. Capital, $15,000. Incorporators: W. J. Kells, A. H. Timpson, F. E. Pratt.

William Herrick Co., Chicago, Ill. To manufacture automobiles and parts. Capital, $50,000. Incorporators: William Herrick, Frank E. Drake, Robert Pringle.

The Chrono Velocimeter Co., New York, N. Y. To deal in automobiles. Capital, $25,000. Incorporators: Junius Howe, Edward Owings Towne, Sara Johnston.

C. H. Bloomstrom Motor Co., Detroit, Mich. Capital, $100,000. Incorporators: Charles H. Bloomstrom, Samuel R. Kaufman, Nathan M. Kaufman.

James Brown Machine Co., Providence, R. I. Capital, $300,000. Incorporators: S. Fred Carpenter, Susan A., Ruth S., Alice J. and James S. Brown.

Empire Track Races.

A programme of races and record trials was built around a match race between M. Bernin with a 60 h. p. Renault car and Paul Sartori with a 90 h. p. Fiat, which was held at Empire Track, Yonkers, N. Y., on Election Day afternoon. The event was won by Bernin by over 200 yards in 9:54 and proved less interesting than some of the minor events.

By far the best race of the day was the final heat of the International race in which Sartori, Bernin and Frank Kulick with the 20 h. p. Ford racer started. Kulick jumped immediately into the lead and gained for nearly three miles. Sartori was second and Bernin third, until the end of the second lap, when Bernin passed him. Shortly afterward a rear tire flew off Sartori's car and he was forced to retire. Bernin constantly increased his speed and gradually shortened the distance between Kulick himself, and finished only one-fifth of a second after him. Time for the five miles 4:48 2-5.

The Empire Handicap also provided a close finish, but Vaughan's (Decauville) handicap proved to be sufficient to enable him to cross the line some ten yards in lead of Bernin, who started from scratch.

Frank Croker (Smith & Mabley) established new amateur records for from one to twelve miles, the former being 0:57 2-5 and the latter in 11:32 1-5. A bad tire prevented his going twenty miles, as originally intended. Earl Kiser, with the Winton "Bullet No. 2," made three attempts at records for fifteen miles, but failed in it. Nearly 200 cars were driven to the track.

Trade Literature Received.

Goodson Electric Ignition Co., Providence, R. I.—Illustrated postal card showing the Goodson Igniter attached to car.

Locomobile Co. of America, Bridgeport, Conn.—Folder giving preliminary specifications of the 1905 Locomobile gasoline cars.

Auto Re-Building Co., 1530 College avenue, Indianapolis, Ind.—Folder showing the transformation of Cadillac runabouts into tonneau cars.

The Garvin Machine Co., New York City.—Pamphlet illustrating Garvin milling machines and attachments.

The Carlyle Johnson Machine Co., Hartford, Conn.—Leaflet and catalogue regarding Johnson friction clutches and reverse motions, more especially for marine use.

Richardson Engineering Co., Hartford, Conn.—Catalogue of gasoline motor driven isolated charging sets, etc.

The Post & Lester Co., Hartford, Conn. —Folder illustrating their new "Neverskip" spark plug.

The Auburn Automobile Co., Auburn, Ind.—Folder regarding the Auburn car.

H. F. Borbein & Co., 2108 North Ninth street, St. Louis, Mo.—A page of testimonials from users of their running gears.

Winton Motor Carriage Co., Cleveland, Ohio.—Folder containing advance information concerning their 1905 product.

Standard Tool Co., Cleveland, Ohio.—Catalogue of twist drills and chucks.

Grant-Ferris Co., Troy, N. Y.—Illustrated catalogue of automobile and marine motors.

Meisel Press & Mfg. Co., 944 Dorchester avenue, Boston, Mass.—Circulars of Meisel's patent combination oil cup, standard size blocks, gear work and special machinery.

White Sewing Machine Co., Cleveland, O.—"White Bulletin, No. 7," devoted to an accounting of the achievements of the White cars at the army manœuvres at Manassas and in the St. Louis tour.

The New York and New Jersey Lubricant Co., of 14 Church street, New York city, have recently put out a non-fluid oil for use in gear boxes, which they claim is sufficiently heavy not to work out of the bearings and joints and yet is light enough to permit any abraded particles from the gears to sink to the bottom of the case and thus get clear of the bearings and gears.

MINOR MENTION

The C. G. Norton Co. have secured the Milwaukee agency for Rambler cars.

The Zent Automobile Co., recently incorporated, will locate in Bellefontaine, O.

The allotment of spaces at the Madison Square is being made at the present time.

It is probable that the recently organized Iroquois Motor Co. will locate in Lyons, N. Y.

The Orlando F. Weber Co., of Chicago, will move to 1322 Michigan avenue, in January.

H. Hurley expects to establish an automobile garage and supply business in Tacoma, Wash.

A scheme is on foot to build a five-mile automobile race track outside of Muskegon, Mich.

Alvan T. Fuller, of Stanhope street, Boston, has secured the agency of the Cadillac Automobile Co.

A race meet will be held by the N. J. C. and M. C. at Waverly Park, Newark, N. J., on November 19.

A course of automobile lectures is to be given during the coming winter by the Y. M. C. A. of St. Louis.

J. S. Wiese has been appointed manager of the New York office of the Swinehart Clincher Tire and Rubber Co.

It is rumored that the Pope-Robinson Co., of Hyde Park, Mass., is to be combined with the Pope Mfg. Co.

The Knox Automobile Co. is preparing plans for a new building to be erected on Division street, Springfield, Mass.

A number of automobilists of Wilmington, Del., participated in the Hallowe'en parade which was held in that city.

Winfield Lee, a full-blooded Shinnecock Indian, is reported to be learning to become a chauffeur in Hartford, Conn.

Mason & Harvey, of Chicago, who were agents for the Austin car, have been succeeded by the McDuffie Automobile Co.

The H. H. Franklin Mfg. Co. are said to be building an eight cylinder racing car for competition in the record trials at Ormond.

John T. Robinson, president of the Pope-Robinson Co., of Hyde Park, Mass., died on November 4 from a stroke of apoplexy.

The Wichita, Kan., Automobile Co. will soon move into a new building at the corner of Williams street and Lawrence avenue.

G. J. Bradley, formerly of the New York branch of the Diamond Rubber Co., has been appointed manager of the Cleveland branch.

Alexander & Crouch have moved their office from their factory at 68 West Monroe street, Chicago, to 33 South Canal street.

H. D. Weed, manufacturer of chain tire grips, with factory at Canastota, N. Y., has moved his office to 28 Moore street, New York City.

The Chicago branch of the Hartford Rubber Works Co. will move into a four-story building at 83 Michigan avenue on November 15.

W. Scott McDonald, of Dayton, Ohio, has brought suit to have the partnership of McDonald & Duvel, automobile dealers, dissolved.

It is reported that 51,000 of the 79,000 square feet of floor space available at the Boston Automobile Show have already been disposed of.

It is reported that the Commercial Motor Co. will make three models of Walter cars next year equipped with 30, 40 and 50 horse-power motors.

The W. N. Booth Motor Car. Co., of Wilson and Payne avenues, Cleveland, Ohio, have taken the agency for the Pope-Hartford and Pope Tribune cars.

Reynold Janney, formerly superintendent of Locomobile Co. and a pioneer in the automobile line, has accepted the management of the Waterbury (Conn.) Tool Co.

At a race meet at Overland Park, Denver, Col., on November 5, Barney Oldfield (Peerless) established a new record for twenty miles, making the distance in 18:45.

It is reported that the Memphis Motor Co., recently organized, have purchased a tract of land in South Memphis, Tenn., upon which they expect to erect a factory.

The Locomobile Co. of America write that Charles S. Deneen, the Republican candidate for governor of Illinois, made use of one of their cars in his campaign work.

Harry A. Leinhard, manager of the foreign department of the Pope Mfg. Co., and Harold L. Pope, will be in charge of the company's exhibit at the Paris Automobile Show.

Augier & Co., of Boston, have recently increased their automobile supply salesroom in the Park Square Station and have opened a branch in the new Tremont garage.

The Autocar Equipment Co., of Chicago, have removed to 240 to 244 West Lake street, corner Peoria street, where they have better manufacturing facilities than in their old location.

Automobile races and a parade of decorated cars will be held in connection with the Cotton States Carnival and Industrial Exposition which opens in Augusta, Ga., on November 13.

Herman C. Mueller, formerly of the Induction Coil Co., of Milwaukee, is organizing the Duplex Coil Co., with headquarters at Fond du Lac, Wis., to manufacture the Mueller spark coil.

The G & J Tire Co. are adding a three-story brick building to their plant at Georgia and Liberty streets, Indianapolis, which will give them about 15,000 feet additional floor space.

The Toronto, Ont., Automobile Co. made an assignment on October 31 to Osler Wade. The liabilities are not known at this time, but the assets consist of the firm's plant and nine automobiles.

At a recent meeting of the stockholders of the R. M. Cornwall Co., of Syracuse, N. Y., it was voted to increase the capital stock to $50,000 in order to extend the automobile branch of their business.

Charles G. Wridgway will have charge of the Peerless Motor Car Co.'s New York branch, which will be opened on or about January 1, in the new building which is being erected at 220-222 W. Forty-first st.

A. J. Picard has been appointed sales manager of the Commercial Motor Co., manufacturers of the Walter car. The company has opened a salesroom at the corner of Broadway and Fiftieth street, New York City.

The Martin & Hart Motor Co. have recently taken quarters at 215-217 North Broad street, Philadelphia. They have taken the agency for the Meteor and Berg cars and also for the product of the E. R. Thomas Motor Co.

The Berkshire Automobile Co., recently organized in Pittsfield, Mass., have leased part of the Whittlesey Building on Renne avenue for a factory and offices. It is expected that the plant will be ready for occupancy by January 1st.

The A. C. A. proposes to post signs in Blandford and Becket, Mass., warning automobilists against taking the "Jacob's Ladder" route (via Becket's Hill) from Springfield to the Berkshires and to go instead by the way of Becket Station and East Otis.

The Richardson Engineering Co., of Hartford, Conn., expect to market a line of isolated charging plants during the coming year, using direct connected and belt-driven dynamos and gasoline engines. Various sizes will be made to charge both ignition and automobile batteries.

John Bradley, a chauffeur, and the Keystone Automobile Co., of Philadelphia, have been sued by Joseph P. Kidd for $10,000 damages for injuries alleged to have been received when complainant was struck by a car driven by Bradley and owned by the company.

While racing with a 90 h. p. Panhard car on Riverside Drive on November 6, E. T. Birdsall, an automobile dealer, crashed into an electric park observation wagon, which, fortunately, was unoccupied but for the operator, and wrecked both vehicles. Birdsall was arrested as soon as he picked himself up, was haled to court and charged with fast and reckless driving. Magistrate Ommen, before whom the case came up, had been an eye witness of the accident and requested that it be tried by another magistrate so that he might act as witness. Birdsall pleaded not guilty.

Automobile races were the feature of the San Antonio (Tex.) International Fair on October 30.

The Chapman Double Ball Bearing Co., of Boston, Mass., are preparing to enter the automobile field.

Nearly 150 students have enrolled in the automobile school of the West Side Y. M. C. A., New York city.

The Fenton, Mich., Automobile Co. is at work on a touring car which is to be propelled by a 20-h. p. motor.

The Durant-Dort Carriage Co. is said to have bought a controlling interest in the Buick Motor Co., of Flint, Mich.

The W. L. Casaday Manufacturing Co., of South Bend, Ind., are constructing a lot of 4-cylinder touring cars, which are to be marketed as the "Williams."

Members of the Boston Automobile Dealers' Association enjoyed an outing at Ferncroft on October 20. The organization is now looking for suitable club rooms.

The Warner Gear Co., of Muncie, Ind., have recently completed an addition to their factory. They expect to have a complete line of transmission gears ready for exhibition at the coming show.

At a meeting of the creditors of the Century Motor Vehicle Co., of Syracuse, N. Y., on October 19, it was announced that there will probably be a dividend to the creditors of about ten per cent.

The city controller of St. Louis, Mo., has drawn a bill appropriating $2,000 to purchase an automobile for the use of Fire Chief Swingley. It will be introduced at the next meeting of the Municipal Assembly.

A seven-event race meet was held at Lincoln, Neb., on November 2, at which the winners were: Frank Packwood (Packwood); H. E. Sidles (Cadillac); A. Whittman, (Pope-Toledo); and A. F. Saar (Rambler).

The Webb speed indicator described in our last issue is claimed to be "dead beat" in its indications, owing to the fact that the head on the aluminum flyer forms with the upper end of the surrounding glass tube a dash pot, thus preventing rapid up and down play of the flyer.

Mrs. Lewis E. Waring, Miss May Waring, O. G. Waring, T. R. Van Bostwick and M. D. Sweeney, chauffeur, were seriously injured when the car in which they were riding struck a telegraph pole in Union, N. J., on November 8, as the result, it is said, of a defective steering mechanism.

The new officers of the Buick Motor Co., recently reorganized in Flint, Mich., are: Charles M. Begole, president; W. S. Bellenger, secretary, and W. H. Whiting and William C. Durant, members of the board of directors. The company have leased the building of the Jackson Purifier Co., of Jackson, Mich., and will operate two establishments—one there and the other in Flint.

The Sturtevant Mills Co., of Boston, Mass., will use a 6-cylinder motor on their 1905 touring car instead of the 3-cylinder one shown in the description of the car which appeared in our columns recently. They will also build a runabout, weighing 1,300 pounds, with an 8-cylinder horizontal opposed motor developing about 24 h. p. It will be designed so that four cylinders can be cut out when the full power of the motor is not required. The Sturtevant Mills Co., Boston, Mass., have built an addition to their factory for the exclusive use of their automobile department.

Ormond-Daytona's Record Trials.

The Florida East Coast Automobile Association has announced the conditions of entry and programme of events for the third annual Ormond-Daytona Beach Coast International tournament, to be held from January 23 to 28, inclusive.

A feature of the event will be the competition for the Sir Thomas Dewar Trophy, which is offered to the winner of the International One Mile Record Race. It is planned to divide the competitors into teams representing the different countries in which their cars were made, and to start them in heats arranged accordingly, the winners of the preliminaries coming together in the finals.

The race for the W. K. Vanderbilt, Jr., Trophy will be at one hundred miles. If there are more than six starters they will be sent off at one minute intervals, and the result decided by time and not by position.

The list of events follows:

100 miles, open to all, for the Vanderbilt Trophy; 1 mile Record International, open to all, for the Sir Thomas Dewar Trophy; 50 miles, open to all, American built cars; 1 mile, for steam cars only; 5 miles, for steam cars only; 10 miles, for steam cars only; 5 miles, time trials, stock cars, above $1,000 to and including $1,800; 5 miles, time trials, stock cars, above $1,800 to and including $2,750; 5 miles, time trials, stock cars, above $2,750 to and including $4,000; 5 miles, time trials, stock cars, $4,000 and over; 5 miles, time trials, racing cars of all classes; 5 miles, gasoline stock cars, $650 and under; 5 miles, stock cars, above $650 to and including $1,000; 10 miles, stock cars, above $1,000 to and including $1,800; 10 miles, stock cars, above $1,800 to and including $2,750; 10 miles, stock cars, above $2,750 to and including $4,000; 10 miles, Ormond Derby, open to all racing cars; 5 miles, handicap, stock cars only; 5 miles handicap; 5 miles Great Ormond Handicap, open only to the first five cars in events Nos. 19 and 20; 50 miles, Daytona Handicap, open to all; 10 miles, Mercedes Trophy; 15 miles, open to 40 h. p. cars or under; Gymkana Race.

Entries close on Friday, January 1st, with W. J. Morgan, 116 Nassau street, New York city.

The Detroit Show.

The fourth annual show of the Tri-State Automobile and Sporting Goods Association will be held in the Light Guard Armory, Detroit, Mich., February 13 to 18 inclusive, under the sanction of the N. A. A. M. The main floor of the hall will be reserved entirely for complete cars, the gallery being given over to the manufacturers of parts and accessories. Allotment of space will be made on November 28 under the direction of Secretary Seneca G. Lewis.

Tire Companies Interest Themselves in Bailey "Wont-Slip" Tread.

The B. F. Goodrich Co. and the Diamond Rubber Co. have taken leases under the patent on the Bailey Wont-Slip Tread and will hereafter supply these to customers. The feature of its construction is a series of rows of small truncated cones about one-eighth of an inch high which run around the periphery of the tire. These rows are staggered so that each cone comes between a pair in the row next to it.

It is claimed for it that it will not slip on wet or greasy asphalt, plank or macadam road, that it makes an easier riding tread as the cones form cusines, that it throws less mud than a plain ribbed tire, as the teeth when released from pressure release the mud directly on the surface of the road, and that it presents a greater wearing surface and is less liable to puncture than is the tire with a smooth tread.

The annual Gaillon hill-climbing contest took place for the sixth time on Sunday, October 30, under the auspices of *L'Auto.* The racing vehicles were divided into the usual categories of cars, light cars, voiturettes and motor bicycles, and was decided to also allow tourist cars to enter into the programme of the event, one condition, however, attaching, viz., only cars which participated in the Chateau-Thierry Hill-Climbing Contest of the Sunday before being allowed to enter for the Gaillon event. The tourist vehicles were classified in the same manner as at Chateau-Thierry, the weights and prices of the chassis being accepted as vouched for at the latter, four categories being created, viz., for cars from 12,000 to 15,000 francs, from 15,000 to 18,000 francs, from 18,000 to 25,000 francs, and over 25,000 francs. Motor bicycles of one-third litre capacity which took part over the Chateau-Thierry course and in the Parc des Princes Consumption test, were also eligible to take part at Gaillon.

MOTOR VEHICLE PATENTS.

United States Patents.

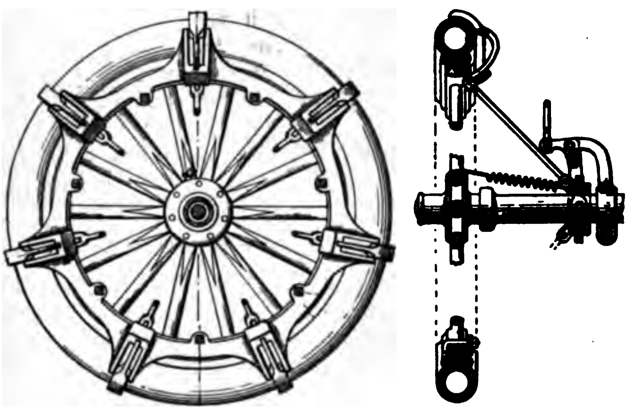
773,812. Controlling Device for Motor Vehicles.—C. W. Russell, of Springfield, Ohio. Nov. 1, 1904. Filed May 11, 1903.

This invention provides means whereby two different mechanisms may be operated by means of a single side lever. The shaft of this lever has bearings in the lower part of a casing which encloses the means whereby the lever is connected to the mechanism. On the shaft are mounted, freely, two arms, one on each side of the lever. One of these arms may be connected to a speed controlling gear, while the other arm may be connected to devices which reverse the direction of motion or operate a brake. Each arm is adapted for engagement by a dog carried by the lever, and this is effected by providing each arm with a notch in its upper end. Each arm is also provided with detent devices for holding it in the position to which it may be moved by the controlling lever. To this end the dog is provided on one side with projecting flanges with notches adjacent to the arms. Each arm is provided with a spring-pressed detent-finger having a double beveled end adapted to engage the corresponding notches, but free to yield to disengage the arm when sufficient power is applied to the lever.

The dog is movable relatively to the lever so as to engage at will either one of the two arms. It is pivoted to the lever and provided with one forwardly and one rearwardly extending arm each with a tooth to engage the notch in one of the upwardly extending arms on the lever shaft. The dog is tilted by means of a rod pivoted to it and extended upward to a hand lever pivoted to the controlling-lever, so as to lie adjacent to the grip thereof. A spring tends to hold these parts in the position shown. The position of the dog is further controlled by a guideway consisting of a flange or ledge, either side of which may be engaged by a projection on the dog. An opening is formed in the guideway through which the projection may pass from one side of the way to the other.

773,942. Slip-Preventing Device for Rubber-Tired Wheels.—M. J. Kelly, of Springfield, Mass. November 1, 1904. Filed October 26, 1903.

A wheel having secured at the inner side of its rim a metallic plate constructed with a plurality of transversely-apertured shoe-guides, the openings in which are adjacent the tread portion of the wheel, combined with a series of curved shoes slidably engaged in said shoe-guiding apertures and provided with inwardly-projecting curved extensions, a sleeve, arranged to encircle the wheel-axle, and freely rotatable in unison with the wheel, a plurality of rods pivoted to the sleeve and respectively connected with the shoe extensions.



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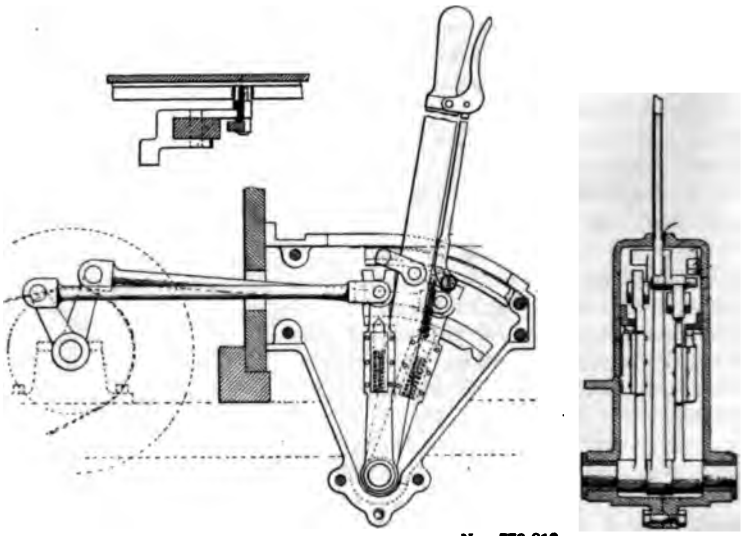
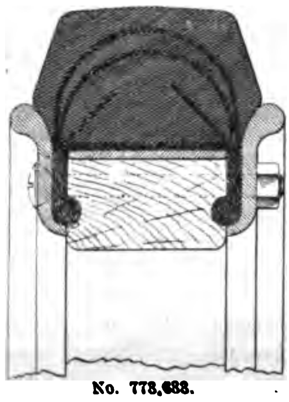


No. 773,812.

773,633. Solid Elastic Tire with Fastening Strips.—Henry G. Fiske, of New York, N. Y., November 1, 1904. Filed July 1, 1899.

The tire is a solid body of rubber molded in a single endless piece. Several loops of strong fabric are molded into the material. The fabric is distributed through the material of the tire with a twofold object—to increase its structural strength and to secure as firm a hold as possible. All of the layers of fabric are looped outwardly and downwardly at each side of the tire to form depending fastening-strips, which strips lie against the sides of the felly and are there clamped and held by the middle portions of the flanges. The lower edges of the fastening-strips are folded over cords which at the same time cause desirable enlargement of the edges of the strips and fit into and are securely held by the side flanges in the recesses formed in the sides of the felly.



No. 773,633.

773,685. Storage Battery Electrode and Method of Making Same.—Elmer A. Sperry, of Cleveland, O. November 1, 1904. Filed January 28, 1904.

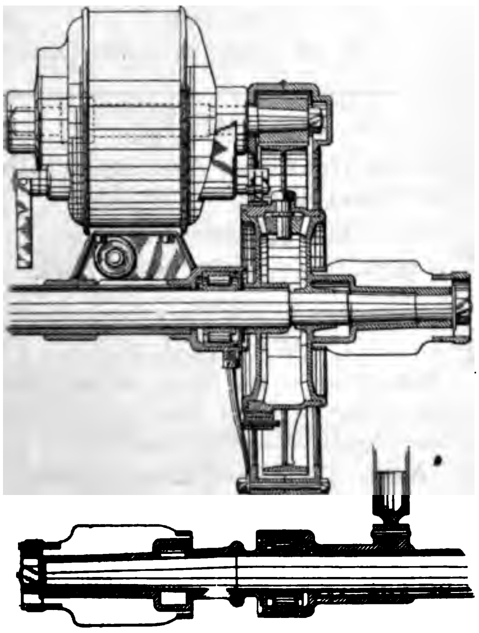
This invention relates to the production of electrodes of the class in which a grid or support carries an active material initially consisting of an oxid of lead. The purpose is to produce a highly porous active material consisting of nearly equal parts of litharge and minium, and to provide the body of porus active material carried by the grid or support with relatively large feeder-pores for the electrolyte.

In carrying out the invention a carbonate of lead is first chemically precipitated from a solution of lead salt. The precipitated lead compound may be the normal carbonate $PbCO_3$ or any of the basic carbonates, but is preferably the basic carbonate known as "white lead," of the formula $2PbCO_3$, $Pb(OH)_2$. The carbonate may be precipitated from an aqueous solution of any soluble lead salt, such as the acetate of nitrate. According to the preferred mode of operation, white lead is electrolytically produced by passing an electric current from a lead anode through an aqueous solution of sodium acetate and continuously injecting carbon dioxid into the solution.

The pure precipitated lead carbonate, which exists in a state of extremely fine subdivision, is roasted to expel the carbon dioxid and produce a highly porous oxid or oxids of lead. The roasting is preferably carried to such a point as to produce a por-

ous mixture containing ten parts of litharge and twelve parts of minium. The porous oxid or oxids may be directly applied to a grid or support. It is preferred, however, to add to the active material a salt or other body which can be readily dissolved out by placing the electrode in water, also a salt capable of partially combining with and hardening lead oxids. Ammonium sulfate is the salt which is preferably employed, from five to ten per cent. being mixed with the active material. The mixture is then applied to the grid or support, being pasted or press-welded in place, and the electrode is placed in water, whereby the greater and uncombined portion of the ammonium sulfate is dissolved out, leaving relatively large feeder-pores for the electrolyte extending throughout the active material. The electrode is then formed by any usual process.

773,575. Automobile.—Alvaro S. Krotz, of Springfield, O. November 1, 1904. Filed February 21, 1903.



No. 773,575.

The improvement relates to the running gear of electric vehicles. One of the claims describes the invention as follows:

The combination of a driving-axle and driving-wheels, one of which is rigidly connected and the other journaled to said driving-axle, and a differential adjacent to and a part of which is directly connected to said journaled driving-wheel, corner-bearings rigidly connected together forming a hub between said differential and rigidly connected driving-wheel, and a motor rigidly connected to said hub adjacent to said differential, to pivot the motor to said driving-axle to hold it in perfect alinement, a brake-shaft supported by said motor and having a friction-band adapted to act upon said differential, and a gear-cover rigidly held to the corner-bearing and motor whereby the gear-cover is a part of and vibrates with said motor and its support, substantially as and for the purpose specified.

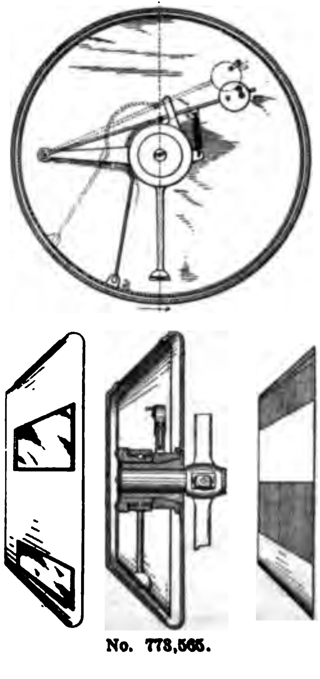
774,115. Condenser.—John Splitdorf, of New York, N. Y. November 1, 1904. Filed October 19, 1903.

This condenser is composed of continuous alternate conductor-strips, each separated by a dielectric or insulating strip and formed into a roll, opposite outside edges of the conductor-strips being exposed, respectively, beyond the outside edges of the dielectrics and the opposite inner edges being lapped over the intervening dielectrics.

Thus the opposite conductor-strips of corresponding width are spread laterally against the respective surfaces of an intervening dielectric strip. In a roll formed of these members another dielectric is added, being placed against that conductor which is to lie inwardly in the roll formation, whereby in the second turn it lies upon and insulates the other conductor-strip. Thus it will be seen that throughout the various convolutions the conductor-strips of opposite sign have an unlike but uniform contiguity with the dielectrics. When a roll of the desired capacity is thus formed, it is flattened out by pressure, and in this form the multiply exposed side edges of each conductor may be conveniently soldered together. Suitable terminals are provided for the opposite conductors and may be connected through the soldering previously referred to.

773,565. Speed Indicating Attachment for Vehicles.—Otto F. Hakes, of Dunkirk, N. Y. November 1, 1904. Filed August 1, 1903.

This invention relates to a speed indicator for automobiles, which shall be operative only after the vehicle has attained a certain speed. Upon an extension of a front-wheel hub is mounted an externally threaded sleeve. On the outer end of the sleeve is rotatably mounted a collar with a peripheral ball raceway containing bearing balls held in position by the hub of a depending arm carrying a bell body at its lower end, the hub fitting loosely over the sleeve referred to.



No. 773,565.

Formed integral with the nut on the sleeve is a radial arm to the outer end of which is pivoted a rod carrying at its other end a ball or weight. A coiled spring holds the rod close to the hub. The rod on which the weight is carried is connected by another rod to a rotatable indicator plate with a flaring side flange, the outer surface of which is divided into sections, alternate ones of which are painted red and white. An angular bell tapper is secured to the centrifugal weight. In operation the rotation of the wheel and its hub will result in a corresponding rotation of the parts forming the indicating apparatus, with the exception of the bell-hanger which, owing to its loose and ball-bearing connection with the collar, will remain pendent. The tension of the coiled spring is such as to insure the retention of the rod carrying the weight, near the vehicle hub until the wheel of the vehicle reaches predetermined speed sufficient to cause the rod to swing to the position indicated in dotted lines. In this movement of the rod the signal-body will be independently rotated to bring its red sections opposite the openings of the outer casing. The red signal thus displayed will indicate that the speed of the vehicle has passed a certain limit, and it is obvious that while this or a greater rate of speed is maintained the red portions of the signal will be continuously displayed. The rotary movement imparted will cause the pivoted angular bell-tapping device to swing outward, producing a ringing contact with the bell at each revolution, the swinging or pivotal arrangement of the bell-tapper being such as to permit of the tapper passing the bell with comparative ease. Through the bell-ringing operation imparted as above described it will be understood that in addition to the visible signal displayed as described an audible signal or alarm is provided which will be particularly useful in indicating the speed limit at night.

772,070. Motor-Vehicle. James C. Thomas, Corsicana, Tex. October 11, 1904. Filed Oct. 22, 1903.

772,080. Cushioned Rubber Tire for Vehicles. Robert Bell, Glencoe, Scotland. October 11, 1904. Filed April 25, 1904.

772,109. Center-Fire Balance-Engine. Rolla A. Morton, San Jose, Cal. October 11, 1904. Filed March 16, 1903.

772,170. Brake-Shoe for Vehicles. William W. Morton, Camden, N. J. October 11, 1904. Filed Dec. 17, 1903.

772,214. Engine and Gear Casing. John Carney, Waltham, Mass. October 11, 1904. Filed Feb. 11, 1904.—A casing of sole leather or some other suitable material, made detachable, to cover the engine, driving gears and differential of Stanley steam cars and the like.

772,239. Spring-Wheel. Joseph B. Keil, Marion, Ohio. October 11, 1904. Filed March 26, 1904.

772,274. Transmission-Gear. Charles H. Day, Hornellsville, N. Y. October 11, 1904. Filed Oct. 16, 1903.

37,184 (Design patent). Automobile-Body. Daniel P. Sammis, Bayonne, N. J. October 11, 1904. Filed March 28, 1902.

772,391. Variable-Stroke Mechanism.—Henry S. Baldwin, Lynn, Mass. Oct. 18, 1904. Filed July 5, 1902.

772,419. Controlling Mechanism for Flash-Boiler Systems.—Hermann Lemp, Lynn, Mass. Oct. 18, 1904. Filed Oct. 2, 1902.

772,463. Motor-Vehicle. William F. Kramer, Dayton, Ohio. Oct. 18, 1904. Filed March 23, 1904.

772,531. Variable-Speed Gearing.—John St. Vincent Pletts, London, England. Oct. 18, 1904. Filed Feb. 17, 1904.

772,571. Electric Motor-Vehicle.—Hiram P. Maxim, Harry M. Pope and Herbert W. Alden, Hartford, Conn. Oct. 18, 1904. Filed Sept. 24, 1897.

772,590. Induction-Coil.—Richard Varley, Providence, R. I. Oct. 18, 1904. Filed July 12, 1904.

772,591. Induction-Coil.—Richard Varley, Providence, R. I. Oct. 18, 1904. Filed July 12, 1904.

772,609. Tire.—Marie G. De Hart, Cincinnati, Ohio, assignor of one-half to Jennie L. Gregory, Washington, D. C. Oct. 18, 1904. Filed March 2, 1904.

772,636. Vehicle-Tire.—James A. Swinehart, Akron, Ohio. Oct. 18, 1904. Filed May 13, 1904.

772,651. Vehicle or Other Wheel.—Samuel T. Felmlee, Chicago, Ill. Oct. 18, 1904. Filed March 10, 1903.

772,654. Safety Device for Vehicles or Other Apparatus.—George H. Fraser, Brooklyn, N. Y. Oct. 18, 1904. Filed Jan. 22, 1900.

772,663. Wheel.—Henry March, London, England. Oct. 18, 1904. Filed Oct. 6, 1903.

772,758. Double-Tube Tire.—Frederick F. Thompson, Lawton, Okla. Oct. 18, 1904. Filed July 23, 1904.

772,812. Metallic Vehicle-Wheel.—Thos. Midgley, Columbus, Ohio. Oct. 18, 1904. Filed Aug. 21, 1903.

772,813. Metallic Vehicle-Wheel.—Thos. Midgley, Columbus, Ohio. Oct. 18, 1904. Filed Aug. 21, 1903.

772,818. Vehicle-Tire.—Charles Olson, Des Moines, Iowa. Oct. 18, 1904. Filed July 30, 1903.

773,588. Pneumatic Tire.—Charles H. Pierce, Alma, Cal. November 1, 1904. Filed June 3, 1903.

773,751. Motion-Transmitting Mechanism.—Thomas J. Kehoe, Fort Wayne, Ind. *November 1, 1904. Filed Feb. 13, 1904.*

773,599. Engine.—Richard M. Shaffer, Baltimore, Md. November 1, 1904. Filed Aug. 19, 1902.

773,639. Vehicle-Frame. — Norman T. Harrington, Detroit, Mich. November 1, 1904. Filed July 30, 1904.

773,934. Muffler.—Henry Ford, Detroit, Mich. November 1, 1904. Filed June 22, 1904.

773,771. Vehicle-Wheel. — Henry W. Adams, Jr., Chicago, Ill. November 1, 1904. Filed March 16, 1904.

French Rubber Importations.

The development of the bicycle and automobile industries, the use of rubber in the manufacture of garments, and the extension of electric lighting and the telephone have caused enormous importations of raw rubber into Europe. Brazil last year exported over 30,000 tons, of which one-fifth was consumed by France. The production of the world is estimated at 50,000 tons, one-eighth of which goes to France.

The industrial consumption of raw rubber and gutta-percha in France in 1902 was 6,217 tons, of which 5,000 tons came from the principal foreign producing countries and the remainder from the French colonies. Brazil, despite foreign competition (especially from occidental Africa), is the principal furnisher of France, entering more than 2,000 tons annually; England enters some 1,400 tons; India, 500; Peru, 280; Germany, 260; the United States, 245; Belgium, 140; and divers little countries of the Antilles, Central America, and elsewhere, 350.

The English market, which on account of its great importations of Brazilian rubber is the principal intermediary between production and French industry, is of much greater importance than all the other markets. The Belgian and German markets do not furnish France half as much as do its own colonies.

Within the last few years Bordeaux has become an important rubber market. Considering the length of time it has existed it compares favorably with that of Antwerp. The latter market, at its creation in 1891, imported 210 tons. Since that year the imports, by tons, have been as follows: In 1892, 629; in 1893, 1,671; in 1894, 2,745; in 1895, 5,310; in 1896, 11,158; in 1897, 17,241; in 1898, 20,145; in 1899, 34,028; in 1900, 56,980; in 1901, 58,492; in 1902, 54,089; in 1903, 57,264. Bordeaux imported 510 tons in 1898; 1,755 tons in 1899; 2,395 tons in 1900; 2,353 tons in 1901; 6,784 tons in 1902, and 11,130 tons in 1903.—Thornwell Haynes, Consul, Rouen, France.

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The Low-Priced Four-Cylinder Car.

As pointed out by a correspondent in our issue of November 2, the automobile public and particularly prospective purchasers, are expectantly awaiting definite announcements regarding the new low-priced four-cylinder models which have been loudly heralded for some months past. Aside from the arrangement and number of cylinders, the public is particularly eager to learn the actual prices and the general features of construction. Our correspondent appears to be of the opinion that for the price, a generally better vehicle could be built if fewer cylinders were used, fearing evidently that quality of material and workmanship will be sacrificed to make up for the greater amount of machine work and fitting required by the more complicated motors. Pointing out that up to the present manufacturers have demanded very much higher prices for cars of virtually the same design, he asks, "How can they do it for the money?"

The reply to this question is that better manufacturing organization and a widening market have enabled manufacturers to greatly reduce prices and to give much greater value for the money. It may be noted that practically all the firms that have so far announced new models of this class are among the largest and oldest established manufacturers, who may certainly be expected to produce at the lowest possible figure, and to be thoroughly familiar with their cost of production. It is also safe to assume that no sacrifice in quality will knowingly be made as compared with the former products of these firms. The high prices of four cylinder touring cars so far have been largely due to the fact that manufacturers were doing a good deal of experimenting, and that the market for such cars was very limited, consequently the price at which they could profitably be sold was greatly increased by "fixed charges." It is obvious that the simple increase in the number of cylinders need not require any great amount of experimenting if the manufacturer has had extensive experience, unless radical changes are also made in the transmission system and in other vital features. Such radical changes of system are, in most instances, purposely avoided. Thus, several manufacturers who have in the past been prominent as builders of runabouts with planetary gears, retain these gears on their four-cylinder cars; one manufacturer who has habitually used the separate clutch transmission system employs the same in his low-priced four-cylinder car, while another who has for a number of years used sliding gear transmission on light cars, naturally retains this system on his four-cylinder car, about to be placed upon the market. In a few cases quite extensive changes of system are made, but they are the exception, not the rule.

That the market for four-cylinder touring cars will be greatly extended next season admits of no doubt. In fact, we learn that already several manufacturers who have announced low-priced four-cylinder models have orders pouring in upon them. The public has become educated to the smooth-running qualities of the well-made four-cylinder machine, and if offered at prices within the reach of the average purchaser, such machines are bound to meet a great demand.

That there is a certain element of faddishness involved in the general rush toward four-cylinder cars, cannot be denied and our correspondent may be quite correct in thinking that when things in the automobile industry settle down to their final level, the car for the average user will be one with less than four cylinders, but fad-

dism is bound to rule automobile design to a large extent for a number of seasons to come at least, or as long as a good part of the movement itself remains a fad. Nothing is so characteristic of this fad influence as the universal use of side entrance tonneau bodies the present season. It is rather doubtful whether the popularity of this type of body will be permanent, but the coming season it certainly will be the fashion, and the manufacturer simply must furnish them if he wishes to be considered up to date. So with four-cylinder construction. When automobiles will be wanted largely for every day use, it may not be as popular as now, but that day is still a good way off, and what concerns manufacturers more at present, and guides their action, is what the demand will be next year. On the other hand, the purchaser of one of the new four-cylinder cars is pretty certain to receive more for his money than was ever offered him in automobiles before, so he may consider himself decidedly the gainer by the present general adoption of four-cylinder construction, whether ultimately this form of construction proves the most suitable for all around purposes or not.

Copper Sheathing for Automobile Bodies.

In a recent article on the exterior finish of automobiles, published in our columns, the writer maintained that the present paint and varnish finish of the body is quite unsuitable for a vehicle intended for every day use, as it scratches easily and soon becomes dull through the destructive effect of oil upon it. From the standpoint of practicability, there is no question that the present method of finishing automobile bodies is not so satisfactory as could be desired, either to the manufacturer or the user. The long time required to allow the great number of coats of paint and varnish now applied to dry, is a source of much annoyance, delaying deliveries, and the destructible character of the finish is a strong objection to it.

It has been suggested lately that copper sheathing might be used to good advantage. Copper, as is well known, when exposed to the weather soon takes on a rich brown color, which is pleasing to the eye, and lasts indefinitely. It could be easily cleaned of any mud or oil which might reach it, without danger of scratching or dulling, and if desirable, could be made to shine brightly by the use of metal polish. Probably the best method would be to construct the body of wood, as is done now, and then cover it with a thin sheet of copper which could be easily bent to fit the various curves and corners. The copper need be only thick enough to prevent tearing, as all strains would be borne by the wood. It could be attached in small panels secured by small rounded strips of the same metal, in places where a flat surface of considerable size makes it impossible to prevent its springing away from the wood. In fact, it might be advantageous to do this throughout, as in case of accident a section or two could easily be replaced without interfering with sections not affected.

Considerable variation of design is possible. The shape of the body may be varied as widely as now, and the patterns formed by the panels of copper may take an endless number of shapes. The metal may be mottled by applying acid in spots. Further, those who wish something out of the ordinary might use a heavier gauge of copper and have it embossed with any pattern desired.

Positive Drive for Ignition Generators.

In a recent issue we referred to the increasing use of mechanical ignition generators. In this connection it is of interest to note that one of the manufacturers of such generators who so far has used the friction drive, has now decided to employ the positive gear drive exclusively, thus removing one of the chief sources of trouble found in such generators. At present ignition dynamos are generally driven by means of a friction pulley bearing against the rim of the flywheel, the pulley being drawn out of contact with the flywheel by a centrifugal governor when the engine attains a very high speed, to prevent the production of a too strong current, which might injure the coil, the circuit breaker and the vibrator contacts. There is no necessity for such a governor on a magneto, as a magneto generator has the property of automatically limiting its maximum output by the reaction of the armature current on the field magnet. Magnetos have therefore practically always been driven by positive gearing, which is, moreover, an absolute necessity if the armature is wound to furnish alternating currents. The automatic governor must necessarily be small and delicate in construction, and being subjected, as it is on a car, to the influence of road vibration and the effects of dust and grit, it is only natural that it should fail in its functions under certain conditions, thus exposing the coil and the vibrator contacts to the dangers from which it is designed to protect them. The liability to failure depends, of course, on the care employed in construction, and has no doubt been greatly exaggerated by the promoters of competing ignition systems, but of its actuality there is no doubt, and its importance may fairly be judged by the decision to abandon the friction drive referred to above.

The object of the centrifugal governor is to limit the output of the dynamo to a certain load, thus accomplishing by mechanical means what is effected automatically in a magneto. It ought to be possible to attain the same end by purely electrical means, as, for instance, a differential field winding, without any moving parts, and consequently much more reliably.

Self-Contained Power Equipments.

One of the long cherished ideals in the automobile industry has been a perfectly self-contained source of motive power, attached to the vehicle frame at a few well chosen points of support and including, upon a single base, all elements necessary for the production of the propulsive energy, with the exception of tanks and electrical apparatus. Development has proceeded to a noticeable degree along this line, and it is not uncommon to find such elements as the carbureter, mechanical lubricator, circulating pump and air fan, integral parts of the engine structure. Indeed, some movement has hitherto been made toward combining the change speed gear integrally with the engine. Quite a number of the horizontal runabout engines are fitted with planetary change speed gears which virtually form a unit with the engine itself, although an independent outboard bearing is usually provided. Horizontal engines have also been quite extensively employed which carry a sliding gear system of speed changing in the enlarged engine crank case.

The advantages of a combined, self-contained engine and change speed gear are the ease with which assembling can be performed, when such a construction is employed; the facility with which the

whole combination may be enclosed and lubricated, and the certainty of the attainment of exact and permanent alignment independent of possible chassis distortion when all related parts are thus held together as portions of a common structure.

The horizontal engine placed lengthwise of the chassis, when fitted with a planetary gear and chain drive, does not lend itself particularly well to perfect enclosure of the engine and speed gear combination, on account of the space required for the passage of the chain, and while an engine of the horizontal type, fitted with sliding change speed gears in the crank case extension, may be well enclosed, it is hardly practicable to arrange the gear shafts so as to secure a direct drive on the high speed. On the other hand, the opposed cylinder motor when placed transversely in a forward position upon the chassis, may be combined with its change speed gear and shaft drive in a most natural, compact and satisfactory manner. The crank case casting is extended rearwardly and in this projection may be located a planetary or sliding pinion change-speed gear, fully enclosed and held in perfectly stable mechanical relation to the motive power.

This form of construction would seem to possess very attractive advantages in simplicity of assembling; all parts not only of the engine but also of the change speed gear are readily accessible through ample hand holes when the bonnet is raised—a feature not characteristic of the French type of construction; a planetary gear when employed under these conditions with the shaft drive transmission may be conveniently run in an oil bath, and furthermore, considerable weight may be saved by the combination of the change speed gear case and the crank chambers into a single construction.

Apparently, this method of integrally combining an opposed cylinder transversely placed engine, with its gears and a propeller shaft drive, is likely to become a very popular one for powers up to 16 or 18 rated horsepower, and it certainly is the closest approach yet attained to a self-contained vehicle power plant which can be freed from its running gear by loosening a few bolts.

This method of placing naturally brings the center of gravity of the car mechanism further forward than any other arrangement and it is conceivable that unless the other elements of the load are arranged with this peculiarity in mind, the load upon the traction wheels may be less than desirable. Indeed, it may be that transversely placing the combined engine and change speed gear under the foot board, instead of beneath the bonnet, as has been done in several recent designs, will be found to secure better weight distribution without any serious sacrifice of convenience.

Traction in Snow.

By N. B. Pope.

The approach of cold weather brings to mind again the problem of securing proper traction in snow. Its solution is more difficult than would appear to one who has not been hopelessly stalled in three quarters of an inch of snow on an asphalt pavement. For it is the smooth, hard pavement that complicates the problem. To obtain traction in deep snow, or snow lying over an earth or macadam bottom, is comparatively simple; but a thin layer of snow on pavement serves as an efficient lubricant for the wheels and it is very difficult to obtain any "foothold."

The distribution of weight in a car, the size of its driving wheels, and tires, and ease of control have much to do with its successful operation in snow. Much, too, depends upon the skill and experience of the driver. Lessons of experience teach a kink here and a turn there, that help very materially in "getting away" when the wheels are spinning and throwing up the snow in fine spray. One learns after a time to take advantage of favorable bare spots and places where the snow lies packed hard, before allowing the car to stand. For it is noticeable that when a car has been standing for some time, there is greater tendency to slip than when it has only just come to rest.

In an effort to overcome this tendency, various devices have been tried, with more or less successful results. Most of them give very material aid in soft snow, but are of little value on paved streets. The tire band, several forms of which are coming into extensive use, is claimed by its friends to reduce the evil to a minimum. The band is ordinarily made of leather or rawhide, and is fastened directly to the shoe, forming a part of it; or else it is a sort of cover, and is laced over tire and rim. The tread is generally roughened by being studded with rivets to give it a better hold. These quite materially aid the traction of the wheels, and possess the advantage of increasing the durability and wear of the tires without greatly reducing their resiliency.

Several forms of gripping devices which may be used with the ordinary forms of tire, have been patented and some of them are in use. Among them is one which consists of two endless iron chains running around on either side of the rim, and joined at equal intervals by lengths of chain running across the tread. The tendency of the grip chains to "creep" around the tire is an advantage, since it distributes the wear. While such a device is of considerable value in snow, a run of two or three blocks on cobble stones is very likely to break one or more of the chains and may endanger the running gear of the car by catching as the wheel revolves.

Fig. 1.

Of the various means which may be extemporized, or made at short notice, probably the best is to take short lengths of old hose pipe, preferably steam or heavy pneumatic hose, cut to just go around tire and rim. Through these, rope of a diameter about an eighth of an inch less than that of the inside of the hose, is passed, and these are tied over the tire and to the spokes (see Fig. 1). These secure a very good grip for the wheel and at the same time are elastic enough so that they can do no harm to the tire.

Another good idea is to take an old outer cover and cut it into sections about six to eight inches long. Leather straps are riveted or sewed to the ends of these, as shown in Fig. 2. Several of these sections may be put over the shoe, and strapped firmly to rim and spokes. In use, the drag of the road on the tire bends the section backward against the shoe, and the snow packing up against it also helps in the gripping effect.

Fig. 2.

Short lengths of chain are used by some drivers, who wrap the rim and tire several times, and fasten the ends to spokes by means of snap catches. This method is effective, but the chains wear the tires badly, besides being noisy, jolting the car badly, and continually breaking.

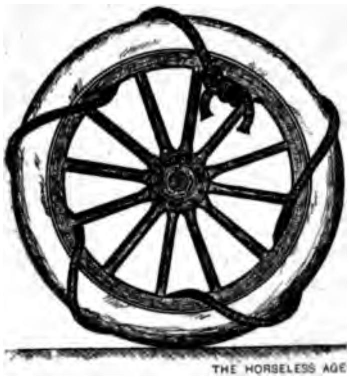


FIG. 3.

Probably the commonest and simplest way, particularly in case of an emergency, is to wrap the wheel with heavy rope. This is very effective, especially in deep snow, does not injure the tires, and if carefully used is not particularly dangerous. But it must be watched very closely, otherwise the rope, which wears quite rapidly, will break and become entangled in some part of the mechanism of the car. Hence in using rope, it must be discarded when it begins to show considerable wear. It should be applied as shown in Fig. 3, using not more than five turns, and putting the ends on the outside of the wheel. The same rope may be used for several successive days by repeatedly shifting it to distribute the wear.

In regard to the use of such gripping devices, it may be said in general that since they always detract somewhat from the smooth running and speed of the machine, and may sometimes become a source of danger; and since a car may often be driven for days at a time without any great inconvenience from slipping, it is just about as well to run without anything of the sort except when the snow is very wet. One should always be provided with some sort of "creepers" however, to be put on in case of an unlooked for stall.

Very often a single grip on one wheel is sufficient to get the car started, for by reversing till the grip is next the ground on the back side, and then driving forward, the wheel acquires quite some velocity in slipping almost an entire revolution, and consequently the grip strikes the road surface with an energetic kick which seldom fails to start the car. Sometimes, in case of a stoppage where rope is not at hand, the car may be rescued by winding a leather strap about the tire, or even by using several turns of insulated wire such as is often carried in the tool box.

At the automobile show in Leipzic, Germany, last month was to be seen a motor bicycle of freak construction with a four-cylinder 8 h. p. air-cooled motor occupying the forward part of the frame. The ignition current is furnished by a magneto secured to the bottom of the engine crank chamber, upside down. The drive is by bevel gears to a belt pulley and from there *to the rear wheel by belt.*

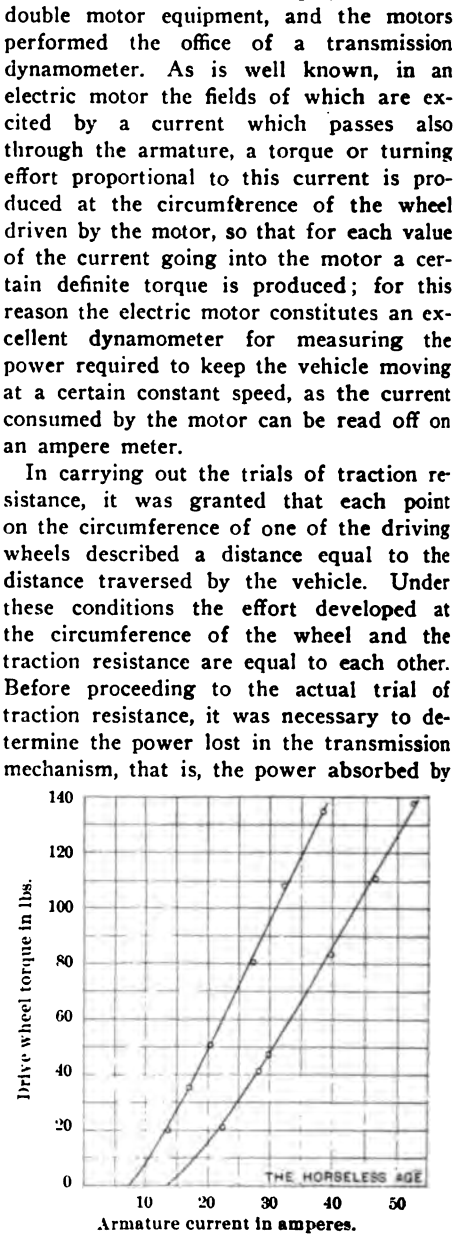
Tests of Traction Resistance with Different Tires and Tire Protectors.

About a year ago a considerable number of tire protectors and anti-skidding devices made their appearance on the French market, in addition to the several non-skidding or armored tires which had been offered to the French automobile public for the last three or four years. A good deal of interest was aroused in these protectors, and the Automobile Club of France organized a competition for non-skidding devices, the chief results of which were published in our columns at that time. A number of the tire protectors proved to be very efficient preventers of skidding, and also showed great durability, machines equipped with them being run, in addition to the distance provided for in the rules of the competition, from Paris to Nice and back, a distance of about 1,500 miles, without any serious trouble either to the tires and protectors or to the propelling mechanism. The only possible objection which could be urged against the protectors after these severe demonstrations, was that they absorbed a good deal of power. This objection was advanced, particularly by one prominent pneumatic tire manufacturer, and to prove the truth or falsity of the assertion, the Automobile Club of France appointed a committee to make comparative trials of the traction resistance with various kinds of tires, and with the different makes of tire protectors. Among the members of this committee may be mentioned R. Arnoux, E. Chaix, Ducasse, Commandant Ferrus, E. Hospitalier, L. Perisse, F. M. Richard and G. Bourcier Saint-Chaffray. The trials were held May 27 to June 8, 1903, on the Boulevard de la Seine along the Paris side of the Seine River between the Neuilly and Puteaux bridges. This course comprises a number of undulations and is not of particularly excellent surface. The period of the trials had been preceded by a fortnight of dry weather which had dried out the macadam pavement, but on the last day of the trials a severe storm broke over the vicinity, and the pavement became deeply cut up. One of the tires entered, the Kelly solid rubber tire, remained still to be tried. As the condition of the road and of the tests were materially different for this tire, the results obtained with it must be accepted with some reserve. It is to be noted, however, that if the road had been only superficially moistened, there would have been no appreciable differences in the conditions of the trial, as the members of the committee who carried out the trials found by actual experiment, with the aid of delicate instruments, that sprinkling of the roadbed as practiced in all the larger cities does not appreciably affect the traction resistance.

In order to compare solid rubber tires with the ordinary pneumatic and with the non-skidding tires submitted for trial, the committee had the different competing tires mounted successively on the rear wheels of an electric automobile. This electric vehicle was of the "Gallia" make, and was not provided with a body other than the driver's seat. By loading it with lead bars, its total weight had been raised to 3,960 pounds, of which the rear driving wheels carried 2,200 pounds, which put the tires under trial on these wheels under approximately the same conditions under which they are operated on the majority of touring cars when carrying a full complement of passengers. The pneumatic tires experimented with were of the standard commercial type, 41 inches in diameter by 4.8 inches width of tread. In order that the wheel might be of the same exterior diameter of 41 inches when fitted with solid rubber tires, which are of less depth than the pneumatics, it was necessary to change the spokes and rims, and retain only the hub.

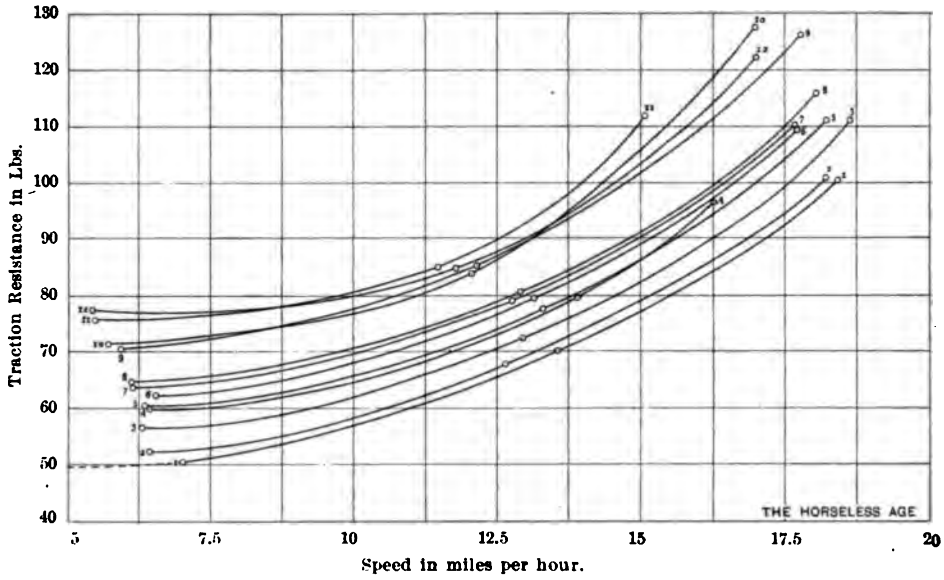
The electric vehicle employed had a double motor equipment, and the motors performed the office of a transmission dynamometer. As is well known, in an electric motor the fields of which are excited by a current which passes also through the armature, a torque or turning effort proportional to this current is produced at the circumference of the wheel driven by the motor, so that for each value of the current going into the motor a certain definite torque is produced; for this reason the electric motor constitutes an excellent dynamometer for measuring the power required to keep the vehicle moving at a certain constant speed, as the current consumed by the motor can be read off on an ampere meter.

In carrying out the trials of traction resistance, it was granted that each point on the circumference of one of the driving wheels described a distance equal to the distance traversed by the vehicle. Under these conditions the effort developed at the circumference of the wheel and the traction resistance are equal to each other. Before proceeding to the actual trial of traction resistance, it was necessary to determine the power lost in the transmission mechanism, that is, the power absorbed by



Left hand curve corresponds to 2. and 5. controller position; right hand to 8. position.

:lectric motor, the transmission gears, :he wheel bearings, in other words, to :ate the motors. To this end it suf- to determine experimentally the char- istic curve showing the variation of orque with the current registered by ımpere meter. The method proposed :. Arnoux and followed in the electro- nical calibration of the motor system, its to get rid of the friction, which is greater in starting than when the ; once in motion. One of the driving ls is blocked up and has applied to it ad leather belt. One end of this belt stened to a spring scale secured to :oor, and the other end has a weight ıed to it. This belt is arranged in a way that the rotation of the driving l tends to lift the weight, and reduce ndication of the spring scale. The ıre developed at the rim of the wheel ıal to the difference in the indication e scale when the wheel is at rest and it is in motion. When the motors tarted up, the indication of the scale lecrease by steps as the controller is l from one notch to another, and when ointer has come to rest, and its read- ıas been taken, a reading is at once of the ampere meter indication. In nanner the wheel rim pressures cor- nding to different currents are obtain- nd points are then plotted on a co- ate diagram through which points a may be drawn. The two curves



1, Torrilhon solid tire; 2, Falconnet regular pneumatic; 3, Falconnet round tread pneumatic; 4, Boland pneumatic; 5, Gallus armored pneumatic; 6, Kelly solid tire; 7, Samson leather tire; 8, Falconnet trapezoidal tire; 9, Herault leather tire; 10, Gallus semi-armored pneumatic; 11, L'Empereur tire protector; Ducasable tire band.

shown in the diagram herewith were obtained in this manner, and represent the relation between motor current and driving wheel effort with the controller handle in the second and fifth, and in the eighth position respectively. When the controller handle is in the eighth position, the fields of the two motors are coupled in series. In this latter case the fields of each motor are excited by a current not equal to, but double the current flowing through each armature, so that a greater turning effort is produced for any particular value of the armature current.

In calibrating the motors the current flowing through one of them (the left one) was measured by a precision ammeter, and the total current by the ammeter provided

CONTROLLER POSITION. Corresponding speed (m. p. h.) Forth, F; Return, R.		85 LBS. PER SQUARE INCH 2. 6.2 F	R	5. 12.5 F	R	8. 18.7 F	R	71 LBS. P. SQ. IN. 5. 12.5 F	R	28 LBS. PER SQUARE INCH 5. 12.5 F	R	8. 18.7 F	R
d Pneumatic Tire...... ht, 82 lbs...............	Armature Current	32.7	32	38	37.5	30	29	38	37	39	38	33	32
	Speed (m. p. s.)...	2.86	2.89	6.06	6.45	6.89	7.69	5.68	6.02	5.32	5.49	7.81	8.18
on Leather Tire........ ht, 80 lbs...............	Armature Current	34	32.5	38	36.5	33	32	38.5	36.5	40	38.5	37	36
	Speed............	2.67	2.84	5.55	5.88	7.57	8.33	5.49	5.‘8	5.05	5.43	7.35	7.93
ult Leather Tire........ ıt, 88 lbs.	Armature Current	35	35	39.5	38.5	36	35.5	39.5	38.5	40.5	39.5	37	36
	Speed............	2.59	2.68	5.20	5.68	7.93	8.66	5.43	5.81	5	5.32	7.69	8.06
nnet Trapezoidal Pneu- ic. Weight, 83 lbs.....	Armature Current	34	33	38.5	37	34	33	38	37	40	3`.5	36	34.5
	Speed............	2.70	2.77	5.68	5.88	8.03	8.12	5.55	5.88	5.20	5.43	7.69	8.06
nnet Rounded Pneuma- Weight, 83 lbs........	Armature Current	32	31	36	35.5	33	32	36	35	37.5	36.5	35	33
	Speed............	2.79	2.86	5.61	5.95	8.33	8.48	5.81	5.88	5.55	5.61	7.69	8.06
nnet Regular Pneumatic ıt, 60 lbs...............	Armature Current	31	30	35	34	31	30	36	35	37	36	32	31
	Speed............	2.86	2.87	5.61	5.74	8.18	8.18	5.81	5.81	5.20	5.32	5.69	7.81
pereur Tire Protector.. ıt, 64 lbs, without Tire.	Armature Current	37	35.5	39.5	38	33	32	39.5	39	40.5	40	36	35
	Speed............	2.43	2.44	5	5.26	6.75	6.85	5	5.26	4.76	5	6.66	7.14
s Iron-Armored Pneu- ic. Weight, 86 lbs.....	Armature Current	33	32	37	37	33	32	36	36	38	38	34	33.5
	Speed............	2.82	2.86	5.88	6.02	7.93	8.33	5.74	5.88	5.32	5.49	8.18	8.18
s Semi-Armored Pneu- ic. Weight, 86 lbs.....	Armature Current	32.5	35	39	38	36	35	....	....	41	41	37	36
	Speed............	2.5	2.52	5.38	5.38	7.46	7.81	....	....	4.76	5	7.04	7.25
sble Protecting Band... ıt with Tire, 133 lbs....	Armature Current	37	36	39	38.5	34	34	....	....	....	....	....	....
	Speed............	2.38	2.46	5.26	5.32	7.46	7.81	....	....	....	....	....	....
hon Solid Tire......... ıt of wheel, 132 lbs.....	Armature Current	30.5	30	35	35	30	31	....	....	....	....	....	....
	Speed............	3.13	3.17	5.95	6.02	8.2	8.33	....	....	....	....	....	....
Solid Tire............. ıt, ...	Armature Current	34	32	38	37	32	32	....	....	....	....	....	....
	Speed............	2.89	2.94	5.88	5.88	8.20	7.69	....	....	....	....	....	....

on the vehicle. The two ammeters thus furnished a check upon each other. However, for the trials with the controller handle set in the eighth position, when the two fields were in series with each other, the indications of the vehicle ammeter (total current, or double that flowing through each armature) was much less variable than the indications of the other ammeter. In such cases one half of the total current was used in the calculations whenever there was a discrepancy between the readings of the two instruments. The greater constancy of the total current under such conditions is readily explained, as when the current tends to increase in the armature of one motor, it tends at the same time to decrease in the other, so that the sum of the two currents is much more constant than either of them. On the other hand, it may be said that the electrical pressure measured by the vehicle voltmeter was subject to only small variations in the course of the trial. For the coupling of the battery of forty-four cells in two parallel series of twenty-two cells each, the variation was limited to between 46 and 44 volts; and with all the cells in series (corresponding to running on fifth and eighth speeds), the variation of voltage was limited to between 88 and 84 volts.

The trials by the committee were made from two different points of view. One series, referred to as comparative trials, were undertaken with the object of comparing the different tires under current practical conditions. Experience having long since shown that the traction resistance of a pneumatic tire varies with its degree of inflation, all the tires of this type were compared among themselves and with solid rubber tires under the same conditions of air pressure in the inner tube; and the uniform pressure of 85 pounds per square inch above atmosphere was adopted for these comparative trials. With the object of determining the law of variation of traction resistance as a function of the pressure of inflation, trials were also made with 71 pounds and 28 pounds pressure per square inch for each tire, the pressure of inflation having been measured by means of a precision pressure gauge. As the course on which the trials were made was not perfectly horizontal, and as the effect of the wind in retarding the motion of the vehicle in one direction and aiding it in the other, made itself felt, the measurements were made on the vehicle running first one way and then the other.

In the table herewith are given the results of the trials—the current required for the different controller positions and with different inflations, and the corresponding speeds. As the figures are of comparative value only it has not been thought necessary to convert the metric measures in which the speeds are expressed into English measures. The variation of traction resistance of the different tires with speed is also represented graphically in the diagram, and one of the most interesting things shown is that one of the solid tires has the lowest traction resistance of all.

Sliding Pinion Change Gear Design.—II.

By P. M. Heldt.

The equations given in the article in our last issue as giving the closest approximation to the face width employed in the gears listed in the table, can hardly be called rational, as it is obvious, on the one hand, that 5/8 inch of the width cannot actually be ineffective, and, on the other, that no such working stress as 82,500 pounds per square inch, as was calculated for the "effective" width of the teeth of the low speed gear of the direct-drive transmission, can actually exist, as the steel would not stand it. The equations given at the end of that article should therefore only be applied in cases where the calculated width ranges between the limits found in the table, viz., 3/4 inch and 1 1/4 inches. The gears on the smaller cars are evidently much more liberally proportioned than those on the more powerful cars, and should therefore last much longer. In the smaller cars there is plenty of room for the gears, as the wheelbase is only little less than in the larger vehicles, and designers of small cars seem to be particularly cautious to provide plenty of strength and wearing quality in the gears. Economy of weight is, however, an important consideration particularly in small cars, and if it be thoroughly understood that the gears in any particular car are very much stronger in proportion to the power to be transmitted, than are those on the average large car, the designer would undoubtedly embrace the opportunity of saving a little weight there, especially, also, as narrowing the gears saves considerable gear cutting work, and thus lessens the expense of construction. On the other hand, the gears on the high powered machines appear in most cases to be very heavily loaded, and their wear may be expected to be short. An intermediate working stress in all gears would eliminate dead weight and give the assurance of long wear of the teeth.

An attempt will here be made to deduce more rational formulæ for the width of the gears than those given at the end of the article in the last issue, and introduce such constants as will give the same load capacity as the other equations for gears of the average width of all those considered in the derivation of that particular equation. The application of equations so obtained would not be limited to any particular range in width, but would be quite general. If there be those who have no confidence in this method, they may use the equations given in our last issue, which, as stated, give the closest possible approximation to present practice for gear widths from 3/4 inch to 1 1/4 inches.

Let us consider the case of a three-speed-and-reverse direct-drive gear with "countershaft gears" at the engine end. In such a gear the pair of gears here called the countershaft gears remain constantly in mesh and do not have their teeth beveled at either end. There would therefore seem no reason why the whole width of the teeth should not always be effective. However, in view of possible inaccuracies of workmanship, and of wear on bearings, an ineffective width of one-eighth inch may be figured on.

Both the low speed and the intermediate speed pinions have their teeth beveled, and as one pinion of each pair is slid along the shaft, a certain allowance must also be made for inaccuracies of setting. In regard to the inaccuracies of setting, it may be pointed out that it is advisable to provide a locking means for the sliding part as near this part as possible, rather than to depend upon the spring latch lock of the gear shifting lever, as the back lash which will develop in the connections in the course of time will render accurate setting of the gears impossible. With a good lock on the shifting bar, certainly not more than one-eighth inch need be allowed for inaccuracy of setting. The same amount may also be allowed for the beveling of the teeth at each end. The intermediate speed pinions are always beveled on both sides, while the slow speed pinions are beveled on one side or on both, according to the arrangement of the reversing pinions. The total ineffective width for intermediate pinions is therefore 3/8 inch, and for low speed pinions either 1/4 or 3/8 inch—in most cases 3/8 inch. In reality the width of face rendered ineffective by the beveling of the teeth depends upon the pitch of the teeth, but one-eighth inch is as much as need be allowed for the largest pitch teeth used for sliding pinions. All the allowances above made are somewhat greater than appears to be actually called for by the conditions, but it is certainly best to be on the safe side.

Making these allowances for ineffective width, in order that the load for a gear of one inch face may be the same as given by the equations in our last issue, the gear faces must be made of a width as given by the following "improved" equations:

For countershaft gears,

$$f = \left[\frac{W}{20{,}000\, p\, y}\right] + \tfrac{1}{8}''$$

For intermediate speed gears,

$$f = \left[\frac{W}{34{,}000\, p\, y}\right] + \tfrac{3}{8}''$$

For low speed gears,

$$f = \left[\frac{W}{50{,}000\, p\, y}\right] + \tfrac{1}{4}'' \text{ or } \tfrac{3}{8}''$$

To illustrate the application of these formulæ, we will calculate the dimensions of a gear of this kind for a four-cylinder 4 x 5 inch engine. The energy developed per minute by such an engine would be, according to our formula:

$8{,}830 \times 4 \times 4 \times 4 = 565{,}000$ ft. lbs.

The pitch line velocity of the countershaft gears should be approximately 800 feet p. m.; of the intermediate speed gears 600 feet p. m., and of the low speed gears 425 feet p. m. In order that with a piston speed of 800 feet per minute the countershaft pinion may have a pitch line velocity of 800 feet per minute, it must have a pitch diameter

$5 \div 1.57 = 3.18$ inches.

It would probably be advisable to use 6 pitch teeth, and a 19 tooth pinion would have very nearly this pitch diameter.

In order to find the pitch diameters and number of teeth for the other gears, we proceed as follows: The slow speed gear will run at an angular velocity 3.2 times smaller than that of the countershaft pinion, and will have a pitch line velocity of 425 feet per minute. It should therefore have approximately

$$19 \times 3.2 \times \frac{425}{800} = 32.3, \text{ say, } 32 \text{ teeth.}$$

Now, let x be the number of teeth of the countershaft gear, and y the number of teeth of the slow speed pinion.

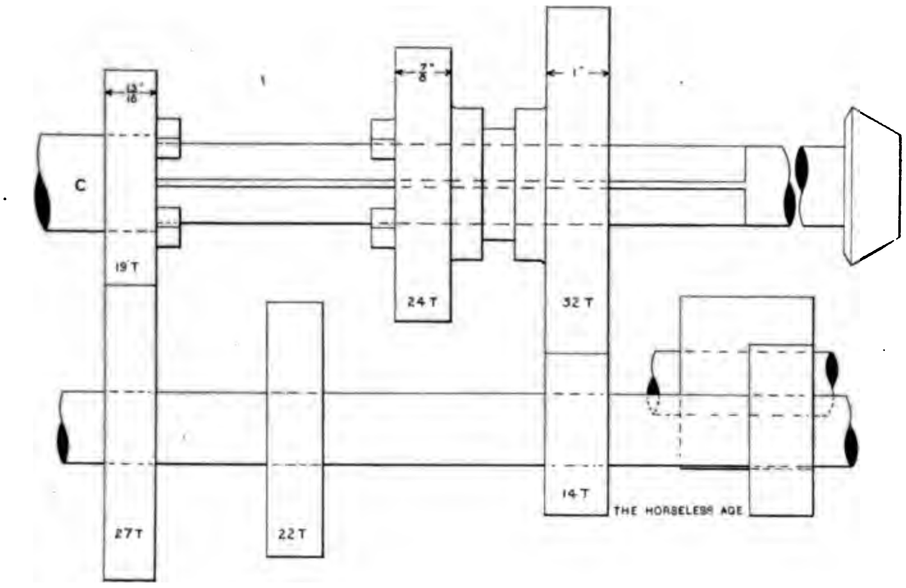
hills with load. The requisite number of teeth can then be readily found by substituting the reduction factors desired for 3.2 and 1.6 in the above equations.

In order to determine the necessary face widths, we must first of all calculate the actual pitch line velocities, and from these and the power developed by the motor, the pressure transmitted on the pitch lines of the different pairs of gears. The pitch line velocity of the countershaft gears is

$$800 \times 1.57 \times \frac{3.16}{5} = 794 \text{ feet p. m.}$$

For the intermediate gears,

$$794 \times \frac{22}{27} = 647 \text{ feet p. m.}$$



Design for Three Speed and Reverse Gear for Four Cyl. 4 x 5 Engine.

$$\text{Then } \frac{x}{19} \times \frac{32}{y} = 3.2$$

$$\text{and } x + 19 = y + 32.$$

Solving these equations for x and y, we find,

$$x = 27;\ y = 14.$$

The number of teeth for the intermediate speed gears are most readily found in a similar manner. Let x be the number of teeth in the driving gear of the pair and y the number of teeth in the driven one. Then

$$\frac{27\,y}{19\,x} = 1.6$$

$$x + y = 46$$

Solving, we find that the whole numbers which come nearest satisfying the equations are

$$x = 22;\ y = 24.$$

These numbers of teeth for the different gears will come very near giving the average reduction factors found to obtain in the gears listed in the table of direct drive gears in our last issue, viz., 3.2 for the low gear and 1.6 for the intermediate. In particular cases it might be considered advisable to use different reduction factors, a large reduction factor for the low gear, for instance, if the car has to be speedy and *at the same time able to climb very steep*

For the low speed gears,

$$794 \times \frac{14}{27} = 412 \text{ feet p. m.}$$

The pressures transmitted at the pitch line of the different pairs of gears is therefore as follows:

Countershaft gears,

$$565{,}000 \div 794 = 712 \text{ lbs.}$$

Intermediate gears,

$$565{,}000 \div 647 = 874 \text{ lbs.}$$

Low speed gears,

$$565{,}000 \div 412 = 1{,}370 \text{ lbs.}$$

We are now able to calculate the requisite face width of the gears by means of the above equations. The necessary width is,

$$f = \left[\frac{712}{20{,}000 \times .524 \times .100}\right] + \tfrac{1}{8}'' = 1\tfrac{3}{16}''$$

For the intermediate speed gears,

$$f = \left[\frac{874}{34{,}000 \times .524 \times .105}\right] + \tfrac{3}{8}'' = \tfrac{7}{8}''$$

For low speed gears,

$$f = \left[\frac{1370}{50{,}000 \times .524 \times .088}\right] + \tfrac{3}{8}'' = 1''$$

The reverse pinion and gear can be made of the same face width as the slow speed pinion. It is understood that all pinions are to be made of high quality medium carbon steel and carefully casehardened.

TOURING ROUTES

To Saratoga Springs by Automobile.

By N. A. T.

(Concluded.)

Next morning we put in four gallons of gasolene, filled our water-tank and were ready for our start just ten minutes earlier than on the previous morning. The road was fine, the scenery exceedingly pretty and the mountain air so fresh and bracing that we were unable to repress our exuberance as we skipped merrily along by the splendid farms lying south of the college town.

At a short distance we met a horse that had never before seen an auto. The occupants of the carriage made haste to get out and away, but this sensible animal saw nothing to become frightened at about the car, for he paid no attention to it as the owner led him by. In passing the farmer remarked: "You're pretty good folks." "We try to be considerate," was our reply; for, having a horse that won't get used to the auto, we know how to appreciate the distress of others.

We were slipping along a nice bit of country road bordered on both sides by a pretty grove, when we saw a woman driving a spirited black horse round a corner just ahead. The horse, from the first sight of us, showed considerable fear; but, motioning for us to stop, this gritty woman tightened her hold on the reins and, seizing the whip, attempted to pass us. But the animal would come just so near each time, and then begin to back. Our offer of help was scorned, and after several trials the woman came off victor, but only after a very narrow escape, for at one moment the carriage hung just at the edge of an embankment, over which the horse seemed certain to back. But what do you suppose? Was she terrified or satisfied? Not a bit. She calmly asked us if we would run slowly for a way so that she could follow and teach her horse that there was nothing to hurt him. We advised her to desist from anything so rash, but she was firm, and before we were off she had succeeded somehow in turning the vehicle around. But we didn't propose to lend any aid to such foolhardiness, so she had to give up and resume her way. To her credit let it be said, however, that she displayed as much nerve and ability in handling her horse as any one we have yet met.

From the hill above the village of Cornwall we got a splendid view of miles and miles of the best farming country in the State. Between this tiny village and Sudbury one can find every variety of roadway imaginable. Now it was fair country road, then clay, dried in huge ruts, again a strip of sand, and further on a corduroy road

through a swamp. Happily this latter was not the kind which Dr. Drummond, in his delightful little "Habitant" poem, tells us goes "Bompety Bomp." Having been kept in excellent repair it was very smooth for its kind. We thought surely this must be the last of the list, and that we would find good roads now, but we were too sure. The farmers were making use of the few days between haying and harvesting to improve the highway; and, accordingly, we soon found ourselves at the end of a long stretch of fresh gravel, which was even then being scattered over the entire roadway.

We discharged our tonneau passengers, and crept along two in the car, and three on foot, forming a slow procession through the deep gravel—to the evident delight of the farmers. But when we did reach the end, it was to find fine, smooth road, built the year before by those same farmers, when all the time lost was easily regained.

As we neared Sudbury, both farms and highway grew more ordinary, yet the valley stretching away to the Green Mountains were as smiling and fair as before. At the crest of a sharp grade above the village we were somewhat surprised to note that our course had turned in the last few miles so that the valley now lay at our right, instead of our left, as it had. Down into the quaint, tiny village we slipped and at the foot of the long decline were just ready for a spin across the level in front of us, when a sharp rapping caused us to come to a standstill as soon as possible. In a twinkling the "bonnet" was off and in another the break was located—in the reverse connection of the engine. A hollow bolt had broken and fallen out. It took but a few moments with cotter pins and pincers for our mechanic to repair the trouble and assure us that all was as good as new again.

Within a few rods of the scene of our breakdown is a very delightful and, we heard afterward, a very select hotel. It is called Hyde's Manor, and is a favorite resort for English people seeking quiet and country air. Beyond the hotel is a long, steep hill where the road is very rough and narrow. In the middle of this, as we were going up nicely, we were signaled to stop. A mountain wagon filled with guests from the Manor was approaching. It seems one of the span was a very nervous horse and had caused three smashups recently, so the driver was rather alarmed at meeting us in such a place. He passed, after some minutes, the guests resumed their seats and were off.

We, however, had to stop to bring up the steam gauge needle to the desired figures, but that done, with a little work at the hand pump, we climbed up and up till it seemed we would never reach the top of this, the longest hill we had ever ascended. Once the summit was gained our reward was waiting and for some distance we ran smoothly along a most beautiful shaded wood-road, then down a pretty decline and out again by a sparkling little sheet of water, where many guests from the Manor were enjoying the boating.

Here we stopped to enjoy the picture before us and incidentally to look over the air pump, which hadn't worked quite to our satisfaction on the long hill. New packing was what it appeared to need and, as that would have to be done later, we pushed on. The way led us by Maple Leaf Farm—such a pretty, quiet place, on the shore of this lake, ideal for rest and recuperation. From the brow of the next hill, when we stopped to help a timid woman and her three little boys get their sleepy old horse by, we got a rare view of the lake-dotted country about us. Then, leaving the height, we dropped down to the plain again, close by a tiny pond made lovely by the quantities of white lilies and green rushes which dotted it here and there and walled in on three sides by green hills, while on the other shore was built a tiny farmhouse. A prettier scene than this would be hard to find, and the road beyond, both for quality and scenery, was ideal.

Down by the tiniest of farms, where little children by the roadside smiled up at us so brightly, through this bower of beauty, we came to the fine road of the level once more. What a change! The beauties which just before had so charmed us contrasted strongly with the utter desolation of the marshland, which lies at the upper end of Lake Bomoseen, and through which we were now passing. Soon, though, the barrenness gave way to beauty again, as we hummed merrily past the pretty cottages and along the shaded road close by the sparkling lake. We passed a three-seater and were greeted most cordially by the occupants, who at once recognized our car.

When Walking was a Delight.

In the Park about Judge Hilton's Home, Saratoga Springs.

The road left the shore and wound in and out, merging at last where the lake was most enchanting in the noonday sunshine. At the lower end we came to a cluster of cottages and small hotels near the terminal of the electric railroad from Fair Haven, and the picnic grounds, Bomoseen Park. After passing a most beautiful country place, which commands a view of the entire lake, and the last of the cottages, the scenery again changes abruptly, and, worse still, the highway here is abominable. It is hard, but so full of hidden ruts that we were on the jump every moment and were glad enough to reach Castleton Corners, where we took the right turn for Fair Haven. A short distance out we met a fellow who told us that 600 of the U. S. Army had just gone by and that we ought to have been there sooner to go along with them. We doubted that last fact even then and felt ever so much surer of it as the dust began to fill our throats. Nearer we drew till we finally caught up with what proved to be the supply wagons and pieces of artillery. Such a string of them as there was, and such a time as we had getting by! We kept to the side of the road, but the dust was so thick that progress was very slow. We hardly noticed the village of Hydeville, or, in fact, anything else, except the politeness of our American soldiery. One of our ladies lost a veil. A soldier

saw it blow away, dismounted and found it, then followed us for some while till he at last succeeded in returning it. This was no little trouble, for his horse objected to very near approach to the auto.

Fair Haven is certainly a pretty town, and here we would have made our stop for dinner, had it not been for repassing the troops. They were following the same route and were to camp at Whitehall, N. Y., that night, so it seemed best for us to go ahead. It was nine miles to Whitehall, and our spirits fell as we came to deep sand outside Fair Haven. We soon left the army wagons behind, however, and were cheered by coming to good but narrow country road. From the valley we now rose again for a mile or two. Although the roadbed grew a little rough for a motor as we proceeded, that was small trouble beside the fact that we could see just ahead the end of a long column of cavalry, which it would be impossible to pass. The dust was dense, the sun was hot and we were hungry and disgusted enough as we were forced to creep slowly along behind the line and watch the exasperating actions of a petty officer left to guard the rear.

After some minutes of this sort of travel we came to a farm where the people were out to see the soldiers. Here we learned that these six troops of the 15th U. S. Cavalry, comprising 330 men and 450 horses, and two batteries of field artillery, 220 men and 250 horses, were proceeding to Manassas, Va., for the army manœuvres to be held there in September. When asking if there were another way to Whitehall, we were informed by the same farmer that "the Government always goes the long way," and that the shorter and better way was quite a different direction. So we turned with alacrity and following his directions, soon found a good route and saved two miles in distance. By a pretty grove we came to the finest stretch of gravel road for some miles back and regained some of our enthusiasm as we hummed blithely along. Soon we crossed the line and leaving old Vermont, dropped down a grade so steep as to make us shudder, rounded the base of a hill, on the side of which picturesque little houses

Picknicking.

The Paulion, Saratoga Springs.

seemed to be literally hung, into the quaint approach to Whitehall, N. Y. The D. & H. Canal runs so close to the cliff that the narrow road seemed almost crowded under the overhanging rock. In our run up and down the street to the station, the quaint, old-fashioned air of the town was very noticeable indeed. The canal with its lock, boats and tow-mules was an interesting sight, however, for one who had not seen it before. As we stopped in front of the Hall House our watches stood at 1.10 P. M., which was not so late, after all. The dinner was very good and the price the same, as at all hotels in small places.

This over, we had a long search for the necessary gasolene, getting a little here and a little there, and finally helping to tap a barrel, but at last set off. We had difficulty in getting up steam, so stopped just over the lock and put in a new vaporizer (we had probably been burning the pilot too high and clogged it). This took but a short while, and at twenty minutes of three we opened the throttle and were soon steaming out by the station and alongside the canal. Comstock was the first village along the canal, and here the highway runs along the tow-path, giving us a good road.

Our first stop was to fix a leak which allowed the liquid gasolene to fire back and cause explosions, and from then on short delays and an unfortunate amount of newly-made road retarded our progress greatly.

As we rounded a turn where the road was very narrow and wooded to the edge, we ran within a dozen yards of a team driven by two small boys. "Go back, go back," one shouted. We laughed and stopped at once. The chap gathered up his lines and tremblingly drove past, remarking "He'd a been scart ef you'd been runnin' fast. Scart me orful, anyway!"

After passing a swamp, where water-lilies in profusion raised their pure, white faces above the vileness around them, the farms began to show marked signs of a long drought and the crops were almost nothing. What a contrast to those just over the hills, only a few miles back!

Glorious old trees line Fort Ann's main street, and mark the entrance to Smith's Basin, the next village.

The highway is fair till we come to a farm whose owner has evidently found stone crushing more profitable or more pleasant than farming. The whir and dust of a large crusher by the roadside gave us a premonition of trouble ahead. And soon enough we found it. All the holes in the road had been filled in with the crushed stone, which made it almost impassable for us. But drivers were kind and gave us more than our share of the highway nearly every time, so we reached Sandy Hill, the first large town, without any punctures. Of all pretty towns we have yet seen, Sandy Hill is the prettiest, and, moreover, has an air of unwonted prosperity. From end to end runs the main street of brick, and along it are almost palatial homes. The situation, too, is enviable, being high over the Hudson. The brick ends in a fine macadamized street leading us out by the Washington County Fair Grounds and down a steep grade into Fort Edward, where the Inter-

North Broadway, Saratoga Springs.

The House of the Late Judge Hilton, Saratoga Springs.

national Paper Company's huge plant was passed. We asked direction and followed it —to our sorrow. Having crossed the river and climbed a steep hill, we soon found ourselves, not as we had been told, near the boulevard which would take us directly into Saratoga, but in a wilderness of sand. We learned later that at Sandy Hill we should have taken the route to Glens Falls thence to Saratoga, but we didn't know it then. No sign of a habitation was to be found and we did not dare try to get back to Fort Edward, for our water supply was very low. Perhaps we were not anxious as we saw this constantly grow less and the possibility that we might be stranded in this desert—within ten miles or so of Saratoga —grow proportionately greater. We had never before had just such an experience and our relief was great when we spied ahead a line of telegraph poles, which meant a speedy return to civilization. Soon we approached a farm—such a poor, dried-up little plot to call a farm—and inquired for the macadam road, which we had been told we would strike by coming this way. Under the guidance of the farmer we made a long detour, but finally came out upon the long-sought haven.

It was indeed a fine speedway, and we promptly forgot our past troubles in a delightful speed. As we flew by, this sign caught our notice:

"Cigarettes, Milk, Sandwiches.
Gum, Peanuts, Tobacco.
For Sale Here."

Evidently these people believe in putting the most salable articles in the most prominent positions. The woods beside the road were very pretty, and being the first we had seen for miles we appreciated the more their coolness and the beauty of the little pond, with its tiny island and summerhouse, lying almost hidden in the shadow of the mountain towering above it. As we wound in and out, enjoying to the full the speed and the shade after our slow pull through the sand, the macadam came suddenly to an end, fully eight miles from Saratoga, and we found ourselves on very poor dirt road once more. Near Wilton, however, the roadway is better and the farms look more productive. In this village we pass the road which leads to Mt. McGregor, the home where Gen. Grant spent the last days of his life.

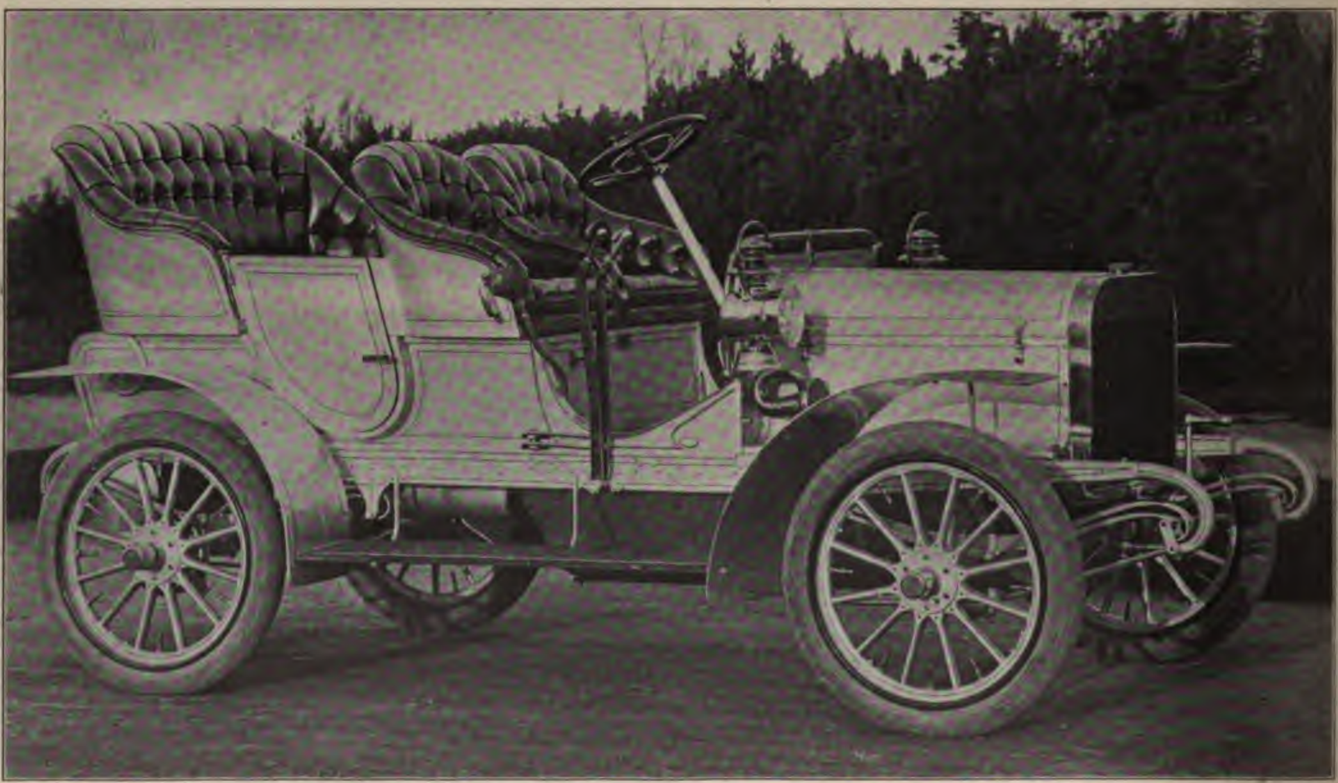
Nothing of interest occurred along the last few miles of the way, except that a small boy running his horse gave us quite a scare and we gave him quite a scolding. We entered the terminus of our run just before dusk, and, though we were tired and dusty, to say nothing of being hungry we almost wished that the morning was to see us on the road again.

With our load of at least 2,400 pounds, and in spite of the miles of sand we had come through, we had consumed only 25 gallons of gasolene for the trip, and our additional expenses had been very light. Yet what a good time we had had and how glad we were to be remembered in the ever increasing ranks of automobile enthusiasts. But if we had enjoyed the car before, how much more were we to realize its advantages in making our stay in that world-famed resort a never-to-be-forgotten pleasure.

In only two places, Yaddo, the beautiful estate of Spencer Trask of New York, and on the Speedway, were automobiles forbidden; and the trips to Kaydeross Park, to Moon's, to Ballston's Spa, and Round Lake, not to forget the perfect boulevards of Saratoga itself (where one is allowed to run ten miles an hour), and the shortruns to the Vichy and Hathorn Springs, or out to the beautiful grounds surrounding the home of the late Judge Hilton; these and many more would not have been one-half so delightful had it not been for the added charm of automobiling. We stopped at one of the less pretentious, but in every respect most desirable hotels, Elmwood Hall, on Maple avenue, and by so doing were near the garage, which is of brick and well equipped. Here our car was stored and washed for $1.50 per day.

Our return trip was almost the same route, save that we ran to Glens Falls, and thence to Sandy Hill, and went over Fairfax's hills to avoid the deep sand of Milton. The second day a tire burst and the last one hundred miles or so were made on the rim, wound with 40 pounds of ½-inch rope, and when that wore out, with the same amount of 1-inch rope. Owing to this delay one night more had to be spent on the trip.

But in spite of all these things, the pleasures of our trip still remained uppermost in our minds and almost at once, we began to look forward to another. Say what you will, you can't convince us that there is any sort of recreation so altogether delightful as a cross-country tour in a perfect motor car.



THE NEW WINTON MODEL C., DESCRIBED IN OUR LAST ISSUE.

LESSONS of THE ROAD

DIARY NOTES BY A USER.

By XXX.

The experiences narrated in the present article relate to the operation of a gasoline car which is now in its fifth season. Several reasons have led me to retain this old machine in service year after year, among which are the following: It is practically impossible to sell an old machine, or one at least which differs in form or external appearance from the latest models, at a price which is at all commensurate with the use which may be gotten out of it. Furthermore it is questionable whether an old machine with which one is absolutely familiar is not actually more reliable than the average of new machines which may require the greater part of a season to become fully "tried out." Selling an old machine generally implies buying a new one and the prices of good cars have advanced so considerably that in order to secure a modern machine which would be sure to prove a great improvement upon the old one a very considerable outlay would be involved. Then too it is a serious problem to select a new car and in the words of the illustrious Burke, "The Past at least is secure."

It is a fact that year after year I obtain a great deal of pleasure from operating the old machine and as I am not fastidious in the shapes of bonnets or the types of radiators so long as they radiate—or particular whether my passengers crawl into the tonneau from the rear or the side, I shall probably try to run it another year.

The many trips which I have taken during the past summer, when no technical incident occurred to break the monotony of the road, I need not enumerate, as they would be of no interest or assistance to any fellow motorist.

REAR AXLE LOCKS.

One afternoon, while out on a 34-mile trip across country, I noticed an unusual sound, apparently originating in the driving chain, but, thinking that it was due to the chains running badly upon the sprockets, I made no investigation until the garage was reached. An attempt to push the machine backward over the floor, showed it to move with difficulty and with considerable cracking and snapping. Still thinking that the chain was climbing the sprocket teeth, on account of a worn link, the chain was taken off, but still the car could not readily be pushed about except in a straight line, and there were doleful grindings in the bevel-differential case, which indicated that something serious had happened. The large sprocket which forms one side of the differential case was removed and the two bevel gears and their three pinions were found to be in a *sorry condition*, having been almost completely stripped. How those gears, in their ruined condition, meshed sufficiently to enable me to reach the station under my own power and "obviate the tow," is a mystery to me. One must admit that occasionally Providence seems to make a special intervention to save the reputation of the poor chauffeur.

It was not a long job to dissemble the rear axle and remove the remains of the stripped gears, and fortunately the differential case had not been cracked during the smash. The web of the large sprocket had, however, been broken by the unusual stresses imposed upon it, but this was easily mended. A telegram was at once dispatched to the factory for a new set of gears, and followed up by a letter enclosing a dimensioned drawing of just what was wanted. I find this latter precaution is advisable, as manufacturers change their styles and sizes so frequently that unless exact specifications are furnished them, a mistake may occur.

GEARS MISDIDRECTED.

It required all my forbearance to await with patience the receipt of these gears, which, after a delay of about three weeks, were found to have been sent by mistake to another town of the same name, where they had been laying unclaimed for at least ten days. When they did actually reach me, I supposed it would be a matter of not more than a few hours to put the machine in operation, but upon trying the gears, it was found that one of them would not mesh properly with the pinions, the teeth of the latter not entering to the proper depth. These bevel gears were not produced in a shaper by means of a cutting motion following the elements of a cone, but were approximately formed in a milling machine, by means of several cuts of a milling cutter, made at suitable angles to give the tooth outline and depth. One of the gears had evidently been removed from the milling machine before the last cut had been made, thus leaving the tooth spaces too narrow to receive the teeth of the pinions. A machinist was at last found who completed the cutting and secured as good a mesh between the gears and the pinions as could be obtained by this method of cutting. Opportunity was also afforded to improve the lubrication of the pinions upon their studs by cutting oil grooves in the latter.

When any wearing part of the machine is taken apart, I always make it a practice to observe whether the lubricator has apparently proved effective, and if not, to seek some method which may render it so.

A COTTER PIN OMITTED.

After assembling the differential and axle, I started out in high glee for a ride about town. The machine seemed to operate very well, but when traveling a stretch of very rough pavement, I noticed that the car was losing speed, although the engine was running very fast. A glance brought to light the fact that the driving sprocket was not turning and was nearly off its shaft. The cotter pin, which secured the holding nut had carelessly been omitted, the nut had jarred off and the key had followed it.

My companion, upon walking up the road a hundred feet or so, was fortunate enough to find the key, which was soon driven into position, but the nut which held it in place was nowhere to be found, and we had no spare nut in the tool box. I always carry a full supply of bare copper wire, and it has often proven a great help in time of trouble. A wire nail was passed through the hole where the cotter pin should have been, and the space between this nail and the end of the key was wound full of wire. The ends of the wire being twisted together, a temporary substitute for the nut was made which effectually prevented the working out of the key and enabled us to get home without more than a temporary humiliation. Before the station was reached, however, and just after passing through a puddle of water, one of the spark plugs blew out—the porcelain having broken from the shock of the cold water splashing upon it. I have for some time been running with a porcelain plug in one cylinder and a mica plug in the other and, while the former has required to be replaced more than once, the latter has given me no trouble whatever. Porcelain is certainly a pretty brittle material for use as insulation where it is constantly subjected to extreme temperature changes as well as severe mechanical shocks.

LOOSE CAPS CAUSE POUNDING.

One afternoon I put on the tonneau and prepared to take some friends to a lake resort not many miles distant. The engine had not been running quite so well as usual for a short time previous, but the easy work required of it around town, without the tonneau, did not render its shortcomings very noticeable. It operated very differently with a heavy load of passengers, when the sandy country roads were reached, and I found that I could not advance the spark any beyond the center without producing most distressing knockings in the crank case. I did not remark concerning this to my passengers, who I do not believe realize to this day that anything was amiss, but tried to alleviate the poundings of the engine as far as possible by using an open throttle rather than early ignition. This gave me an excellent opportunity to observe the heating effect of a late spark, as the water was soon boiling merrily on account of the large and inefficient fuel consumption. Before we had gone very many miles, it began to rain, and I think I never hailed a shower with any more joy, as it afforded the desired excuse for turning back. I reluctantly (?) steered for home, and in a very few minutes after reaching the garage had the crank case open and the connecting rod bearings once more tightened into running condition. They had evidently been gradually growing loose for some little time, but their looseness had not previously reached a critical stage. My passengers assured me that they had a beautiful ride. I didn't.

New Vehicles and Parts

1905 Locomobile, Side Entrance Model.

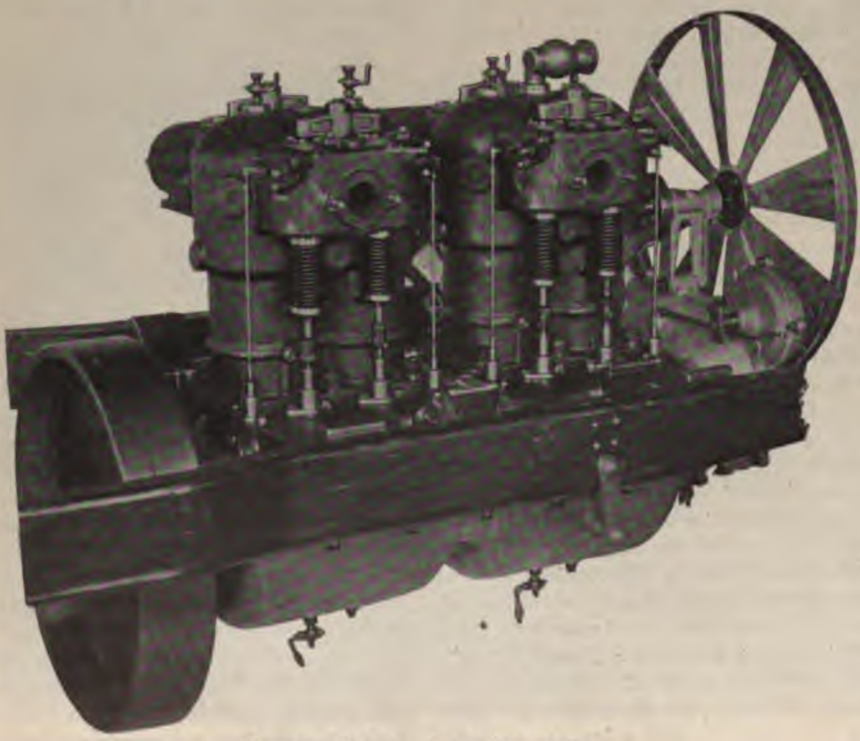
The Locomobile Co.'s 1905 Product.

We are now able to give particulars concerning the product of the Locomobile Co. of America for the year 1905. Four models of touring cars will be marketed, all of which will be propelled by four-cylinder motors and fitted with side entrance tonneau bodies. One of these will be essentially the same as last year's car, the only change being in the design of the body, as noted above, and in the use of an increased compression in the motor, which results in the development of greater power. This car will be rated at 20-25 horse power, and will be fitted with jump spark ignition, with dynamo and storage batteries, automatic admission valves, and the Riker patent channel iron frame. A complete description of this car was given in our issue of December 23, 1903.

There is no radical difference in the construction of the other three models, and no great departure from the general practice of the company as seen in last year's cars, except in the construction of the motor and its accessories, and in the use of pressed steel frames. The motors used in these models are rated at 15-20 horse power, 30-35 horse power, and 40-45 horse power, and are all of exactly similar design. We give herewith a front and admission valve side view of one of them. It can be seen that the cylinders are cast in pairs with the heads integral with the cylinder walls, and are, of course, water jacketed. The admission valves are mechanically actuated and seat in ports located on the opposite side of the cylinders from the exhaust valve ports. All valves are interchangeable and are closed by strong coil springs of large diameter, the lower ends of which pass through slots formed in the ends of the valve stems.

The cam shafts and cams are one-piece drop forgings, case hardened and ground, and operate in compartments formed on either side of the crank case. Hardened rollers are fitted to the plungers, which lift the valves, and these are of square section for part of their length and work in guides in the manner common in practice to-day.

One of the illustrations herewith shows the top of a motor with one of the valves removed, and gives a very clear idea of the manner in which this is accomplished. Above each valve is a cap which fits into the top of the port. These are held in position by a single stud bolt and cross member between each pair of admission and exhaust valves, so that but four nuts need be removed in order to take out all eight valves. The caps fit into tapered seats formed in the top of the ports and are ground to an air-tight joint in the same manner as the valves. An annular groove is cut about midway of the bearing surface on the caps to secure a perfect fit at all times.



View of Engine, Inlet Valve Side.

The admission valve ports are "Siamesed," that is, a single pipe is run to each pair of cylinders; the exhaust gases, on the other hand, pass out through separate pipes of short length into a ribbed chamber, from which they are conducted by a single pipe to a muffler located at the rear of the chassis.

The construction of the crank, connecting rods and pistons is similar to that of last year. The crank is provided with three bearings, one at each end and one at the center between the pairs of cylinders; and is so formed that the outer pistons move together. The boxes for the shaft bearings are fastened to the upper part of the crank case so that the bottom can be removed while the crank and pistons remain in place. The fly-wheel is bolted to a flange formed on the end of the crank shaft instead of being secured by a key, as was the case last year.

The four piston rings are now fitted in separate grooves, and are of the eccentric type with oblique joints. The pistons are ground to a slight taper to allow for the unequal expansion.

To the new motor the low tension make-and-break type of ignition is fitted and a magneto is used to supply the electrical energy. This is driven through a case-hardened flexible coupling by a gear engaging with the half-time gear on the admission valve side of the motor. One of the armature wires is grounded and the other runs up and across the top of the cylinder, connecting with the insulated members of the make-and-break devices. Connection with them is made through small knife switches which may be opened by small handles which are provided in order to test the ignition.

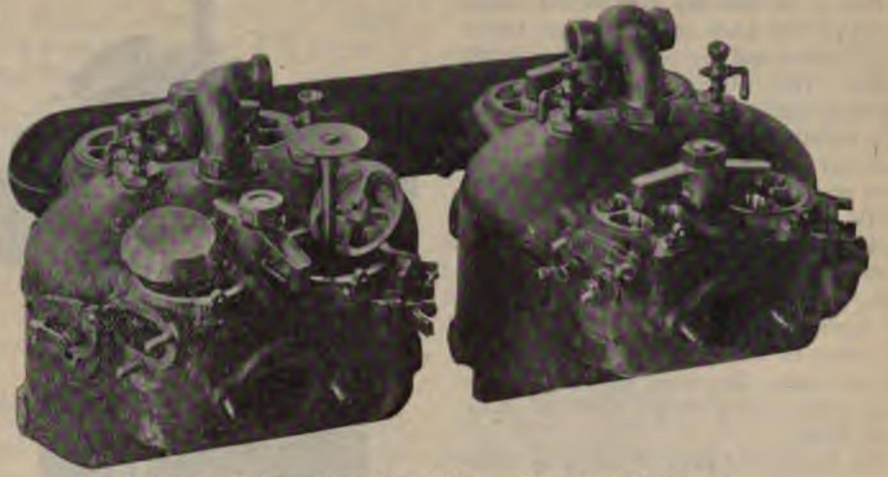
The ignition device proper consists of the

anvil and rocking hammer mounted er on a small plate which bolts t the side of the cylinder with the t parts inside. The hammer is ht into contact with the anvil by the of a cam formed on the admission cam shaft against a roller at the foot small vertical rod, which at its upper connected, flexibly, with a lever con- d with the hammer. The rupture is ed by a stout spring. The anvil is so that it can be turned about while in on to present a new surface for the ical contact.

e cams which operate the ignition anism are of the helical type so that ming of the spark may be varied. To his the whole cam shaft is shifted hwise in its bearings, the valve cams made sufficiently wide to make this ble. This construction is used to re- the number of parts to a minimum thereby to secure simplicity and posi- ess of action.

e regulation of the speed of the motor fected by throttling the incoming gas ell as by the variation of the time of ion. A fly-ball governor attached to exhaust valve cam shaft acts upon a n valve located at the carbureter at the where the gases pass into the admis- pipes. The tension of the springs h act against the fly-balls may be in- ed or decreased at the will of the ator in the usual manner by a small located on the steering column or foot-pedal, and the speed of the motor s accordingly.

e carbureter is of new design and pro- s for an automatic regulation of the ure. A diaphragm upon which the suc- of the motor acts is located at the top he device. As the suction increases



SHOWING ARRANGEMENT OF VALVE COVERS AND YOKES.

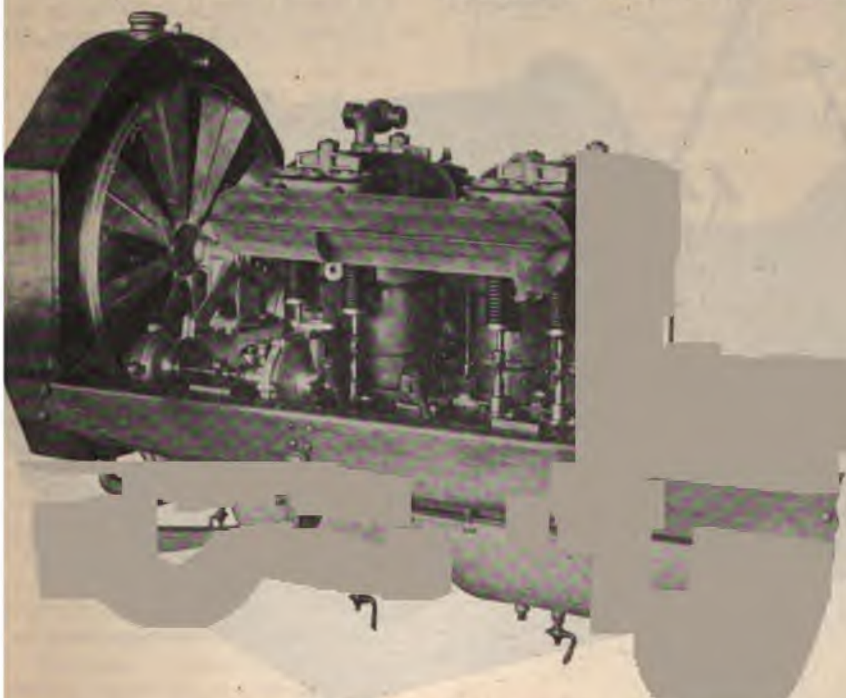
with the speed of the motor, the diaphragm correspondingly compresses a small spring which holds it in place, and uncovers a series of small triangular holes through which the extra supply of air, needed to maintain the proper mixture, passes. These holes are made with the apex of the triangle at the top and are uncovered by a downward movement of the valve so that the area of opening increases as the square of the distance passed through by the valve. The remainder of the carbureter is constructed along lines of common practice, having a float feet and gasolene jet.

On the side of the motor, opposite to the magneto and carbureter, is the centrifugal pump, which, like the magneto, is gear driven through a flexible coupling. From the pump shaft a belt is run to the fan behind the radiator, which revolves on ball bearings—the only ones in the car. The radiator is of the honeycomb type, as before.

The supporting arms of the motor bolt directly to the side members of the frame and the change gear box is bolted to cross members. As has been said, pressed steel is used for the frame in the three new models. This takes the customary channel iron shape, the side members being tapered toward both ends, and slightly bent inward at the front, to narrow the frame. Gusset plates are bolted at all four corners. Four semi-elliptical springs are fitted, varying in dimension with the various models, particulars of which are given later. These rest upon axles of I-beam section with drop forged ends, the bearing surfaces being ground. The wheels are bronze bushed and are of the usual artillery type. The change gear box is of the same design as was used last year and gives three forward speeds and a reverse, with a direct drive on the third in all but the 40-45 horse power model. In this case four speeds are provided, the direct being on the fourth. The so-called "selective" system is used, there being two sliding members on the main shaft and an H-slot provided for the movement of the change gear handle. In all four models the gears and shafts of the transmission system are carried in a frame of manganese bronze which is attached to the cross members of the main frame so that the aluminum covers, top and bottom, serve merely to enclose the pinions and to hold the lubricating oil. The clutch releasing yoke, change gears and operating mechanism and the bevel driving gears and differential are all located on the same frame and enclosed in the same housing. The driving power is transmitted to the wheels by side chains as before.

The complete car shown in the photograph herewith is the 15-20 horse power model, but the cut will serve equally to illustrate the larger cars, as there are no marked changes in the general lines. It may be of interest, however, to give a few of the specifications for each model, so that the detail differences may be appreciated.

In the model shown the cylinders of the motor are 3¾-inch bore by 4½-inch stroke, and we are assured by the makers that brake tests have shown that it is capable of developing more than the rated horse



VIEW OF ENGINE, EXHAUST SIDE.

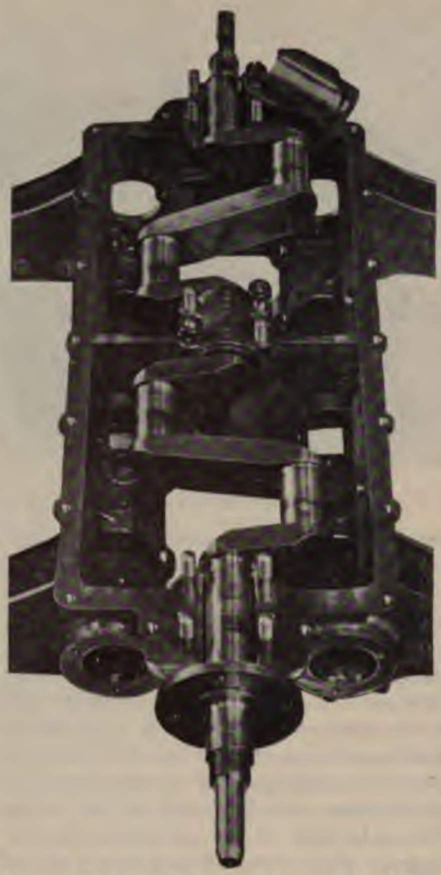
power, as is also the case in the larger models. The front springs are 36 inches x 1¾ inches, and the rear, 44 inches x 1¾ inches. The wheels are 32 inches in diameter and are fitted with 4-inch tires. The wheel base is 92 inches and the complete car, without supplies, weighs about 1,800 pounds.

The motor in the 20-25 horse power model has a bore and stroke of 4 and 5 inches respectively. The springs are of the same length as those used in the smaller car, but are 2 inches wide. The wheels are 34 inches in diameter and are shod with 4½-inch tires. The wheel base in this case is 96 inches and the weight of the car about 2,300 pounds.

The wheels and tires of the 30-35 horse power model are the same as those fitted to the 20-25 horse power, but the wheel base is 106 inches long. The motor has cylinders 4½ x 5½, bore and stroke. The springs, fitted to this car, are 40 inches rear, both sets being 2 inches wide. This car weighs about 2,500 pounds.

As has already been noted, the 40-45 horse power car is fitted with a four-speed gear box, and this being the "big" car of the company, is designed to give an abundance of speed. The engine cylinders are 5-inch bore by 6-inch stroke, and, we are told by the designer, has developed 52 horse power on the brake. The front springs, fitted to the car, are 40 inches long by 2 inches wide, and the rear springs 48 x 2 inches. The wheel base is 110 inches. The wheels are 34 inches in diameter and are shod with 5-inch tires. The weight of this model is about 3,000 pounds.

A feature in the construction of all the models is the extensive use of drop forgings. Wherever it is possible to do so a drop forging is used. Among the larger pieces are the axle ends, housings for the differential and the valve cams and camshafts.



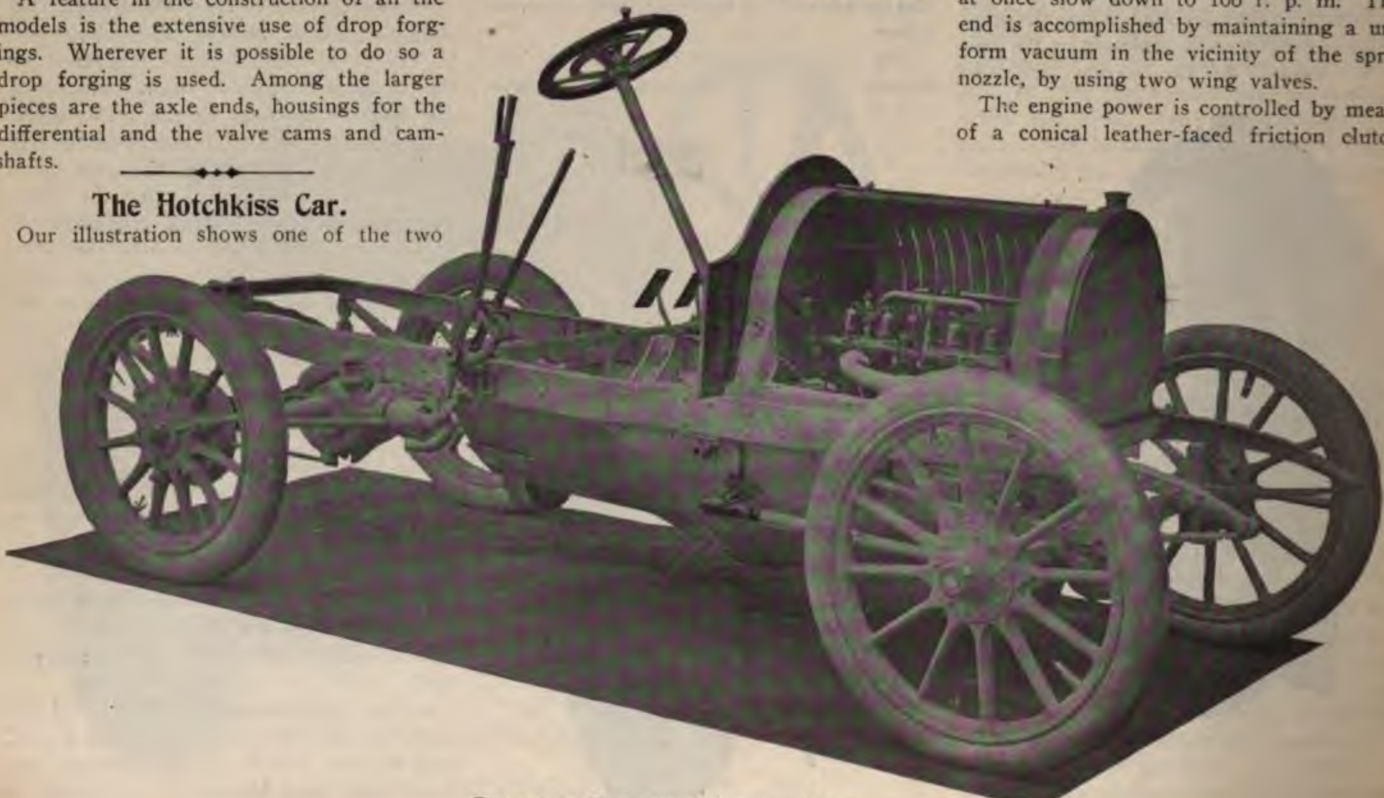
Bottom Part of Locomobile Crank Case

The Hotchkiss Car.

Our illustration shows one of the two touring car models of Hotchkiss & Cie, the well-known gun makers of St. Denis, near Paris, France. This firm, which took up the manufacture of complete cars only about one year ago, is now producing two models, an 18 h. p. and a 35 h. p. The complete car is of rather odd appearance, owing to its bonnet of nearly cylindrical cross-section, the low arrangement of the machinery and the dust pan running nearly the whole length underneath the frame. The mechanical design is also to a certain extent a departure from conventional practice, especially in that ball bearings are used throughout, even on the engine crankshaft.

The engine is a four-cylinder upright one, with inlet and exhaust valve chambers on opposite sides of the cylinders, and cast integral therewith. All valves are mechanically operated, a separate cam shaft being, of course, provided for each set. The cam shaft gears are entirely enclosed in aluminum casings. Ignition is on the low-tension magneto system with a special design of make-and-break mechanism which is claimed to give a quick break even at low engine speeds, as when starting up. A special feature of the ignition system is that a plug switch is inserted in each of the leads to the make-and-break terminal, so that by withdrawing a plug with hard rubber handle from any of these switches, a rapid test can be made of the operation of the corresponding cylinder. The cooling is effected by means of a cellular radiator made up of triangular tubes, which forces the water to take zig-zag paths in rising through the radiator, by which more efficient cooling is claimed to be obtained. A new form of carbureter is used which has no supplementary air inlet but is nevertheless claimed to be entirely automatic in its action, and when it is desired to stop the car and throttle the motor down, all that is necessary is to move the throttle lever to its extreme position, when the motor will at once slow down to 160 r. p. m. This end is accomplished by maintaining a uniform vacuum in the vicinity of the spray nozzle, by using two wing valves.

The engine power is controlled by means of a conical leather-faced friction clutch



Chassis of Hotchkiss Touring Car.

the shaft of which is connected to the change speed gear by means of an Oldham coupling consisting of three parts, the middle one of which a floating member. Any slight disalignment between the bearings of the engine and the change gear box will therefore not cause any binding. The change gear is of the customary sliding pinion type with two sliding sets; it gives four forward speeds and a reverse, with direct drive on the high speed. The two sliding pinion sets are operated by means of a single lever which moves on a gridiron quadrant.

The car has a live back axle and bevel gear and shaft transmission. The live rear axle is of that form of construction in which the axle tubes extend through the wheel hub and take the entire weight on the axle, thus relieving the drive shafts of all sagging strains. The driving bevel pinion is mounted on ball bearings, one at either side of the pinion, which insures a perfect mesh of the pinion and gear under all conditions. The casing over the differential and the bevel gear drive is divided in a horizontal plane, so that the top half can be removed and the gear inspected without disturbing any adjustments.

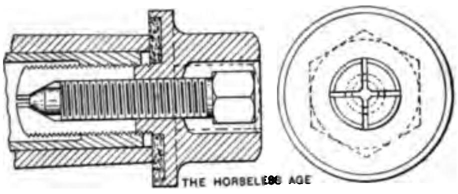
The Hoyt Motor.

The construction of the Hoyt motor, designed and built by G. P. B. Hoyt, of Jamaica, N. Y., and illustrated by the drawings herewith, departs in a marked degree from current practice. The object of the designer is to do away with the side pressure of the piston against the cylinder which is present in all motors in which the rectilinear motion of the pistons is converted into rotary motion by the usual connecting rod and crank. The motor here shown is of the two-cycle type, but the same principles, so far as the conversion of the motion is concerned, are employed in those of the four-cycle variety. It is of the four-cylinder horizontal-opposed type.

The pistons are provided with piston rods similar to those commonly used in steam engine practice, these rods being secured rigidly to the piston head, while at the opposite end each is fastened to a yoke formed by two vertical members and a shorter cross member at the top and bottom. The motor is provided with two crank shafts one above the other, which are connected together by a pair of gears at each end. They revolve, of course, in opposite directions. The crank pins bear in blocks which slide between the vertical members of the yokes, so that these blocks move toward each other for one half of each stroke and away from each other during the other half. In this way the pressure of the gases within the cylinder is applied equally upon the two cranks which are at all times equidistant from the longitudinal center line of the piston rod, and is transmitted, therefore, in a straight line along this rod, with no side pressure of the piston *against the cylinder wall.*

The flywheel is attached to the upper shaft, and the power taken off at the opposite end of the lower one. The motor here shown differs somewhat from the usual two-cycle motor in the method of admitting the gas into the cylinders, the arrangement here adopted being made possible by the piston rod and yoke construction. A plate, provided with a stuffing box through which the piston rod passes, is screwed into the inner end of each cylinder, and the compartment formed between it and the inner side of the piston is used, as is the crank case ordinarily, to draw in and compress the gas before it is admitted to the explosion chamber. As the dead space is much smaller than in the ordinary crank case, a higher compression is obtained before the gas passes into the explosion chamber, with the result that it travels through the bypass P with comparatively greater rapidity, and, being directed by the baffle plate B against the side of cylinder and across the spark plug and cylinder head, has, in the opinion of the designer, an increased scavenging effect.

The admission pipes from the carbureter run to ports A in the side of the cylinders and the exhaust gases pass through the ports E at the top, the piston acting as a valve which covers and uncovers them at the proper time. The inventor claims that he has found from brake tests that only a comparatively small allowance for friction need be made in computing the horse power of the motor, explaining that the combined friction of the blocks in the yoke is less than that caused by the side pressure of the friction in the more common type.

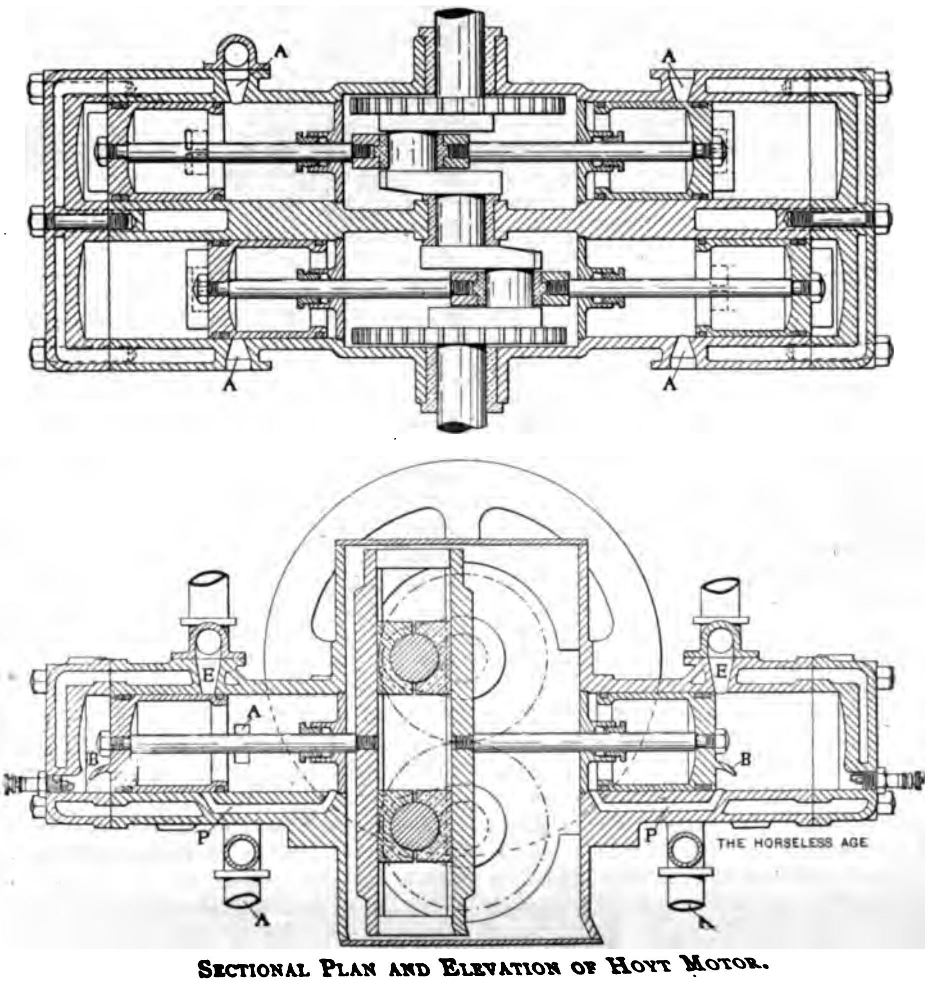


Spencer's Lock Nut.

The Spencer Lock Nut.

The Spencer lock nut, manufactured by F. W. Burdick, Hartford, Conn., is designed for use with a chambered axle. The threaded shank is split lengthwise into four sections, and its centers and that of the head, are drilled out to receive a smaller screw which runs into it lengthwise. This screw is fitted with a tapering point which bears against an internally-tapered surface formed in the end of the shank. When the nut has been brought up to its proper position the small screw is tightened and the wedge action of its end against the tapered surface causes the sections of the shank to spread apart and thereby lock the thread against any backward movement.

The nut may also be used as a capscrew and many places where a lock nut is required.



Sectional Plan and Elevation of Hoyt Motor.

The Radcliffe Semi-Planetary Gear.

The semi-planetary change speed gear here shown, designed by C. R. Radcliffe, of 2131 Broadway, New York City, derives its name from the fact that at times its containing case is permitted to revolve about the center line of the main shaft in the manner common to planetary gears, while at other times the case remains stationary and the drive is made through the gears and shafts alone as is the case in other forms of change speed groups.

Four distinct gear ratios are provided for forward speeds and one for a reverse motion. These are brought into use by a system of internal positive clutches, the gears remaining constantly in mesh. However, in changing gears, a gradual change is made from the maximum speed of the driven member when one set of gears are in use to the maximum when the next higher ratio is used, by allowing the containing case to revolve about the main shaft, so that the actual speed of the driven members is the resultant of the speed at which this case revolves and the ratio of the gears in use. As a result of this combination of two systems of gear change, it is possible, theoretically at least, to obtain any speed of the driven member from zero to the speed of the motor shaft. In the first instance the lowest gear ratio would be in use with the case revolving at the speed of the driving member, and in the latter case the direct drive would be in use with the case remaining stationary. This statement can be more readily comprehended after a glance at the construction of the gear.

The power from the motor is applied at the coupling M, and is conveyed through the various gears and shafts to the shaft J, which connects with the remaining parts of the transmission system. The main shaft is built up of the hollow piece A, to which the coupling M is attached, the hollow shaft K which fits inside it and the shaft J which in turn fits within the shaft K. Both H and K are capable of a lengthwise movement in their respective bearings, the drive to J being made through the feather Q. The countershaft Y revolves on the shaft L, and secured to it are the gears G, E, C, and B, the last named being attached through a roller clutch or rachet and pawl, the office of which will be described later.

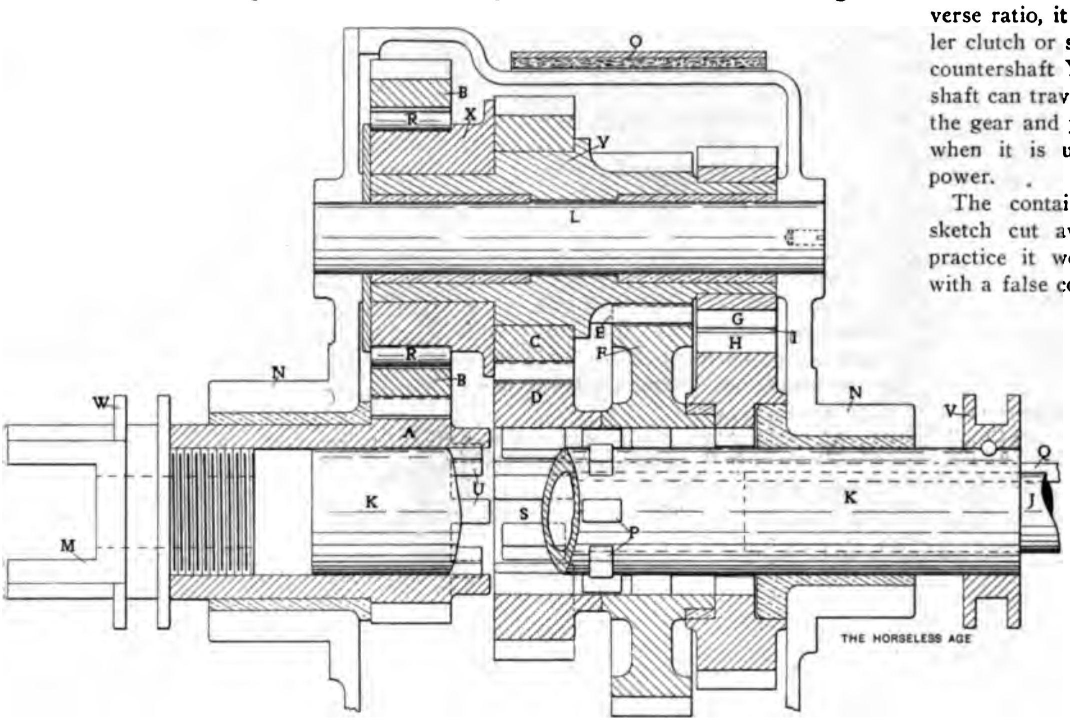
On the shaft K are formed a series of radial studs D, and on the inner side of the gears D, F, and H, a corresponding series of radial slots are cut. These and the studs on K can be seen best in the plan view of the gear D which is shown at the right of the group. These gears bear on the shaft K, the part upon which D bears being cut away in the sketch to show the construction better.

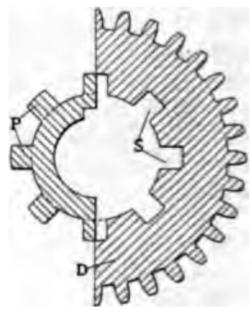
For the first and third speeds the gear H (which is cut on the hollow piece A) and B serve as the first reduction. To obtain the first speed, the shaft K is moved outwardly by means of the collar V until the studs P come into engagement with the slots in the gear F. The drive then is from M through the gears A and B, and the roller clutch R, R, to the countershaft Y. From here the motion is transmitted to gears E and F to the shaft K and by the feather Q to the shaft J.

The second speed is obtained by moving the shaft A inwardly by means of the collar W until the projections formed on the inner end of shaft engage with the slots cut in the gear D. In this case the drive is through gears D and C to the countershaft and through E and F to the shaft J. The third is obtained by moving A out of and K into engagement with the gear D. The drive is now through gears A, B, C, and D. To obtain the direct drive, the projections on A and the studs on K are brought into engagement with the slots in the gear D, which thus serves as a coupling and locks the two shafts together. For the reverse, the shaft K is moved outward until the studs P engage with the gear H, which meshed with an intermediate gear I (not shown).

When the second speed and direct drive are in use, the ratio of the gears D and C would made the countershaft Y revolve at a higher speed than does the shaft A. For this reason and because the gears H and B remain constantly in mesh and are in inverse ratio, it is necessary to provide a roller clutch or some other means between the countershaft Y and the gear B, so that the shaft can travel at a greater speed than does the gear and yet will be driven by the gear when it is used to transmit the driving power.

The containing case is shown in the sketch cut away on the lower side. In practice it would be cylindrical in shape, with a false countershaft and counterweight on the side of the main shaft opposite to the countershaft Y, so that the whole would balance when revolving. About the outside of the case is a band brake four inches wide with which the movement of the case is controlled. When a change is made from any speed to a lower one the brake is allowed to slip and the case to revolve in its bearings N, N, until the speed of the driven member is reduced to its maximum speed when the next lowest gear is in use. The actual gear change is then made in the manner described above. In changing to a higher gear, the case is permitted to revolve as soon as the change is made, and the speed of the driven shaft is gradually increased by tightening the brake until the case comes to a stop. It would seem to be possible, therefore, to make gear changes without jar or without wear on the clutches.





SECTIONAL VIEWS OF RADCLIFFE'S SEMI-PLANETARY GEAR.

COMMUNICATIONS

Account of the Boys' Auto Trip.

Editor HORSELESS AGE:

Although THE HORSELESS AGE is comparatively a new-comer at our house, I always give it preference to the three other mechanical publications which I subscribe for, and I read each issue with great interest. What I like particularly are the departments of "Lessons of the Road" and "Touring Routes."

Consequently I thought that you might be interested in this brief contribution concerning a short trip I took about a month ago, when I brought our machine here. It was from our summer cottage at Westbrook, Conn., to our winter quarters here at Flushing.

The car was bought with the understanding that I should care for it and be responsible for its "getting there." I am a boy sixteen years old, and my chum who made the journey with me is a year younger. We made our preparations a day before the start. That evening everything was all ready for an early start. Everything was thoroughly oiled, the chain graphited, tanks filled to their utmost capacity, the body clean and all brass shining. The tonneau was full, and held much more than the avoirdupois equivalent of two passengers. Here we had five gallons of gasolene, three gallons of oil, a twenty-pound chest of tools, a lot of old and new dry cells, some extra inner tubes, two suitcases, a bag of golf clubs, numerous other packages, etc., etc. With everything aboard the little 10-h. p., single cylinder car was pretty well loaded. We two boys weighed about 255 lbs.

The next morning, after a good, hot breakfast, we got aboard and left the barn at 5:13 A. M. The straw had decided the night before that my chum, Fritz Fiske, should have first turn at the wheel, so he was driving now. It would be my turn at East River, about 12 miles west. We alternated in this manner for the whole trip, each fellow having a straight run of about 12 or 14 miles.

We were now off on our longest journey, and maybe we weren't joyful! We sped along merrily through the cool mists of the morning, and had a clear road for miles. Clinton, the first village out, we made in record time. A few minutes later we had a brush with a rabbit for a short distance, but bunny soon surrendered and dived into the underbrush. At East River we stopped, did some hurried oiling, and were off again, with myself at the wheel. Everything was going finely, and we were in high spirits until we reached Guilford, about 18 miles out, when we thought we could detect a slight loss of power. The motor never missed fire, the explosions were regular, but some little thing was out of the way. We meanwhile maintained a good gait, but were annoyed at the conduct of the motor. When Branford was reached, at 6:45, the mystery was cleared up. We left the motor running while oiling up, and while I was oiling the valve levers, with the footboard up, Fritz gave a cry of exultation and pointed to the spark plug. The connection had broken and the spark was jumping a gap of *almost an inch* at every explosion. We immediately stopped the engine and made a good and lasting contact. But what puzzled us was why she never missed an explosion during eight miles of running. I might say here that our batteries were new at the start, and we alternated the sets at each relay.

New Haven was reached at 7:22, and the next incident of the voyage occurred at Savin Rock, about four miles out of the city. Here, while oiling up, we allowed the motor to stop. A few minutes later, when ready to start up, I confidently inserted the crank, but there was "nothing doing." A hasty examination showed that both pawls in the starting rachet had dropped out and the crankshaft was not turning at all. We were not at loss for an expedient, for the breaking of the starting chain a few weeks before had made us wise. So, hailing a couple of fellows from a nearby saloon, we all began to push. Then I threw in the clutch. After numerous trials, during which it was necessary to open the relief cock, we got the motor going. We gave the fellows a quarter and hopped aboard and were off. It may be easily imagined that at the slightest sign of the motor's slowing down we would go back to first speed, rather than stall the motor. At 8:55 we hauled into Milford and stopped in front of a repair shop to inquire how long it would require to rig up some pawls. The fellow assured us "only about half an hour." So we stopped the engine and Mr. Mechanic crawled under the car and looked at the ratchet for about five minutes steadily. I could see that he was no good and mildly suggested that we had better have it fixed up at Bridgeport. He was glad to give the job up, and we got a mob of school children who were looking on to give us the required push, and we were off again. We arrived at Bridgeport at 9:46, but were unable to get the pawls here. As we were leaving this place we noticed that the radiator was becoming pretty hot from the continued running and necessary slow-going through the city. We therefore hauled up at a horse-trough and administered cold water to the tank, while the petcocks on water jacket, tank and circulating pump were allowed to be open. When at last the water became fairly cool at the water jacket, we closed the cocks and again proceeded.

Through South Norwalk at 11:08 and Stamford at 11:45 we kept on without a stop. After leaving Stamford we began to eat our luncheon, of which we had a most bountiful supply. (This meal was in progress from Stamford to Pelham.) New Rochelle was reached at 1:35 P. M., and then our luck failed us. We were going along a fine road of white brick and were just preparing to rush a hill, when a sudden and awful crash and crunch from below sent our hearts to our throats. We immediately stopped the motor and got out. Our stout chain was scattered all over the road for a hundred yards back. Not a piece six inches long remained. While we were surveying the wreck, a trolley bound for Mt. Vernon came by, so I hopped on, yelling to Fritz to collect the links and rollers and watch the car. The trolley passengers thought it a great joke, but my spirits were not very high. In a few minutes we reached Mt. Vernon. I telephoned my father in New York and explained the situation. He said he would telephone the garage for a man, and meanwhile I telephoned and telegraphed the garage myself, to make things doubly sure. I gave the location of the car as best I could, but I was in a strange place and my directions were, perhaps, rather vague. About four-thirty father arrived on the scene, but no auto-man. Finally, about six o'clock, a couple of Dagoes came along with a team, and one of them asked if he could tow us to town. We offered him a dollar, which he accepted with alacrity (he didn't know his business), and in one half hour he had us landed in front of the Mt. Vernon Auto Station. After supper father took the train home, and we boys put up for the night at a little German hotel. Next day at one o'clock our man showed up with chain and pawls, and at four-thirty we were off again. The man had come up the previous afternoon, but not being able to find us, had gone back again.

We had a good run down to New York City, stopping but once in Central Park, when we tightened the chain. Going down 99th Street I never saw more urchins in my life—all yelling, "Git a horse!" Upon looking round we saw a whole mob of kids hanging on the tonneau. When we finally scared them off (and they stuck like leeches), the stones began to fly. One struck the horn beside Fritz and another hit the back of my seat, but luckily we had soon passed. A minute later we were at the ferry, where father met us as agreed. When we pushed the car off the boat at College Point, it was quite dark, and after lighting the lamps, we struck a good gait which we maintained until we reached our place in Flushing, at seven-thirty.

Fritz and I both voted the trip a great success and were proud of our achievement. But next spring when we go back to good old Westbrook, we hope to cut down the time for the 125-mile trip.

NATHANIEL S. SEELEY.

Barred from Motor and Accessories Manufacturers' Association.

Editor HORSELESS AGE:

Some time ago we made application for membership to the Motor and Accessory Manufacturers' Association, our application being properly endorsed by two members. We are just informed by F. E. Castle, Secretary of the Association, who is also secretary of the Gray & Davis Co., lantern makers, that our application has been rejected.

This is not altogether surprising to us, for it seems that the several lantern makers who figure in the organization and seem to control its affairs, have been hurt very seriously by the competition of our searchlight—in fact this competition has been so severe that they have during the last few months abandoned all their former designs of acetylene lights and are now coming out with the most slavish copies of our light, which they call their latest creations.

We would not give two cents for all the good or harm the association can do us, but we did want to stand some show in the allotment of the New York Show space. We think this rejection of our application is a matter worthy of serious attention of all your readers, and would ask you to make some mention of it.

RUSHMORE DYNAMO WORKS,
S. W. Rushmore.

In Re Automobile Progress.

Editor HORSELESS AGE:

In re Mr. Damon's letter on automobile progress, I am in substantial agreement with all that he said, and could add facts confirming both the correctness of his views and conclusions. For instance, one manufacturer, in the field as early as 1898, produced in 1899 very serviceable automobiles which then did good work and which are still in almost daily use in some few instances. In 1900, when I bought my first machine, the promised improvements faded away in disappointment. The increased horse power of the engine was not an advantage, as the weight of the machine was much greater. The earlier model stood up much better in actual daily use than my own. So far as I could learn, my fellow users of this model all met the same disappointment.

If one examines the entire line of 1905 manufactures, the first thing to impress the mind is the vast differences between the complexities of certain makes and the extreme simplicity of others. When I recall the complexities of my first machine and compare these with the simplicity of the best air coolers of to-day, I am almost inclined to exclaim, "The Millennium is at hand." Simplicity is the *sine qua non*. It has been my guiding principle in each subsequent selection, and in no instance have I met disappointment. The second machine had a simple butterfly valve in the large pipe which supplied the mixed gas to the inlet. Its operation was perfect; there was no possibility of derangement, and it throttled as perfectly as the throttle of a steam engine. This was a vast advance on the corresponding device on my first car. My third machine, a popular runabout, retained the same advance in simplicity—a most serviceable machine, which I have just sold, after driving it nearly 10,000 miles. But for certain defects in its cooling system it was perfect as compared with the first model.

The fourth machine is daily expected. In it the ultimate simplicity has been attained. Despite the absence of water, its cooling is more perfect than was that of my last machine.

Mr. Damon's conclusion: "Examination of the 1905 models now on the market shows that the designers have expected them to be run by men who understand the work necessary," must in all fairness be supplemented thus: While the complexities of multicylinders, water cooling and complicated governing and controlling devices remain, one may find evidence of progress in the advent of models, practically "fool proof" in their simplicity. Even the novice may undertake the operation of these latter machines with great confidence after a very little instruction.

DANIEL LONGAKER.

Finish.—"Carriage vs. Machine."

Editor HORSELESS AGE:

The answer on page 476, to Dr. Stapler's letter on Finish, is very interesting, as it illustrates the difference in the point of view between the practical user and the manufacturer. The latter says: "I am not much interested in finish, for until autos can be depended upon to get back every time they go out, there are certainly more important things than finish." In other words, as long as any other improvement is possible, it would not pay to improve the durability of the exterior. This point of view is quite natural, for by supplying a temporary finish to a machine and by expending *all* his energies in improving the mechanism, the manufacturer is able to sell the user each year the "latest model," all unscratched and shiny and "much more reliable" than last year's machine.

"Why does the doctor favor four cylinders? It is certain that eventually complication becomes objectionable." This is very true. A car should therefore be as simple as possible under the circumstances, but, as the manufacturer states, "The auto of the future will be the simplest that can be made to meet its user's needs." This is the vital point. What the public demands is a car that will run without vibration or noise, and one having great flexibility of control. These features cannot be satisfactorily embodied in a single cylinder machine. In this case the four cylinder car seems to fulfill the requirements better than anything else on the market, although the two and three cylinder engines have their uses on lighter machines.

"Why does the doctor think buggy forms horrid? Carriages have served their purpose for many decades and changing the propelling force does not change the purpose." Suppose then that we place flanged wheels on an ordinary carriage, hitch it back of a locomotive and transport several passengers in this conveyance from New York to Chicago in winter weather. It is doubtful whether the passengers would admire the superior features of the carriage form, although "changing the propelling force does not change the purpose," which is evidently to get over the ground. Again, suppose that an ordinary carriage were hitched behind a large touring car and towed over country roads for one hundred miles at the rate of twenty miles per hour. While the occupants of the touring car were enjoying the scenery, it is more likely that the carriage passengers would be busily occupied gathering up their loose teeth. Of course "changing the propelling force would not change the purpose," but it certainly would change the conditions of travel, and it is obvious that the "ordinary carriage" is not the best design for a mechanically operated vehicle. The new conditions have to be met by a *new* design and this ideal of comfort and reliability is slowly but surely being approached by the modern four cylinder touring car. The "horseless carriage" is a back number.

S. L. FRENCH.

Foreign Tires on American Rims.

Editor HORSELESS AGE:

We enclose a copy of a letter which we write to the rim manufacturers on the subject of rim cutting.

THE CONTINENTAL CAOUTCHOUC CO.

(Inclosure)

To the Rim Manufacturers:

"We respectfully call your attention to the style of rim you are manufacturing and the effect that same has on Clincher Shoes of the correct type now being manufactured abroad and imported into this country in large quantities.

"Having sold many hundreds of metric and American size Continental tires, and never having had a single case of rim-cutting on foreign cars, we have come to the conclusion that it is the American rims and not the foreign made tire which is at fault.

"The accompanying sketch will serve to give you a correct idea of the fit of a foreign made shoe on the foreign made rim, compared with a foreign made American size shoe on the American made rim.

"If you will note the section marked "B" in the accompanying sketch, you will see the position in which the shoe rests on the American rim before the security studs or lugs are drawn down in place, and you can readily imagine the strain and consequent

rim-cutting which must result from forcing the bead strip into place, and by so doing, bringing the side wall of the shoe in contact with the sharp edge of the rim flange.

"Not only does this rim-cutting, which causes customers considerable annoyance and us useless expense, result from incorrectly constructed rims, which bring the strain all in one spot on the shoe; but in a great many instances where rim-cutting occurs, we find that the inner extremities of the curled flanges of the rim are extremely sharp and rough.

"We also find that the American made rim is not uniform in its dimensions. We have noticed a variation of as much as 3-16 inch between the width of the mouth opening on the side of the rim and the same opening on the other side.

"We write this letter to you for the reason that we find this purely unnecessary drawback to motoring is becoming worse every day, and we believe that some means must be adopted very shortly to affect a cure; therefore, we request that you take up this matter of rim design, and we believe that by so doing, and co-operating with us, that rim-cut tires will shortly become a thing of the past."

W. E.'s Carbureter Trouble.

Editor HORSELESS AGE:

Having read with interest the trouble which W. E. has had with his carbureter, I take the liberty of making a suggestion which is based upon a similar experience with a carbureter of the same make as his. I had endless trouble, and never stopped my car with any confidence of my ability to start it. I wrote to the manufacturers of the car, who informed me that the angle of the point of the needle valve was incorrect and that they had discovered that if I would change it to 71 degrees I would find a radical improvement. This was done and since that time I have had no trouble whatever, as my car, a single cylinder, starts on scarcely a turn of the crank, and I never have to flush the carbureter. It seems like a fairly tale, but on several occasions it has started when I turned the switch on.

The conditions that obtain in my car might not apply to W. E.'s car, and I would suggest his writing to the manufacturers to ascertain the angle which they suggest for his car. In the bottom of the float chamber of the carburetor there is a screw plug; by taking this out and screwing into its place a pet cock, any sediment or water that collects in the bottom of the carburetor can be drawn off; aside from this it is a great convenience to be able to draw off gasoline to wash the hands after road repairs. WM. H. COOMBS.

[Practically all our correspondents on this subject leave out of account the symptoms of whistling which ceases when the power drops down. This could not possibly be caused by an incorrect angle of the needle valve point or by a loose thread on the needle valve. That the whistling ceases when the power fails is an unfailable sign that the suction is then greatly reduced, and, of course, the suction is not at all affected by the gasoline needle valve. The trouble may be caused either by some obstruction in the inlet pipe which is automatically cleared away at times; or by improper action of the mechanical inlet valves or of the exhaust valves. For instance, one of the bearing bushings on the cam shaft might have worn slightly eccentric and loose, and turn around in its seat periodically, which might cause the valve lift to be reduced. We would suggest that W. E. carefully measure the lift of all valves when the motor is running perfectly, and again when it has the spells of faintness, and if any difference should be discovered, it would be a good indication of the cause of the trouble.—Ed.]

Explosion Engine Query.

Editor HORSELESS AGE:

What is the lowest pressure of a gasoline engine cylinder charge that will ignite (so that 60 per cent. of the charge will be effective and explode). The engine is four-cycle and mixture 1 to 6. READER.

[The question cannot be answered definitely, as by far the most important factor is the heat of the spark. With a good spark it will ignite at less than atmospheric.—ED.]

Production of Aluminum in America

In the United States Geological Survey appears an article by Joseph Struthers on the production of aluminum and bauxite in 1903. The author regrets that he has been unable to obtain exact statistics of the production of aluminum, owing to the fact that the only producer in the United States, the Pittsburg Reduction Co., declines to make any statement regarding its output. Mr. Struthers observes that the phenomenally rapid progress in the iron and steel industry in the United States is largely attributable to the willingness of the individual manufacturers to discuss their own practice and thus by co-operation to help the others and in turn be helped by them. In spite of the policy of the Pittsburg Reduction Company, it is safe, however, to estimate the production of aluminum in the United States during 1903 at 7,500,000 pounds, as compared with 7,300,000 pounds in 1902, and 7,150,000 in 1901. Mr. Struthers bases this assumption on the fact that the uses of the metal and its alloys have been recently greatly extended. Bauxite, the crude mineral from which aluminum is extracted, has been consumed during the last few years in successively larger and larger quantities, and this also would seem to indicate that the production of aluminum is steadily increasing.

The chief point of interest affecting the aluminum industry in the United States during the year 1903 was the final adjudication of the many law suits and counter law suits which have been instituted from time to time in behalf of the Electric Smelting & Aluminum Company, operating the Bradley patents. The sum involved was approximately $3,000,000. On October 13, 1903, a friendly agreement was made by the two companies to the effect that the Pittsburg Reduction Company should pay a given sum for the quantity of aluminum produced by it up to the date of the agreement, and should continue the manufacture of aluminum under license of the Bradley patents until the time of their expiration, in February, 1909, paying a royalty for all metal produced in the future. The operation of the Electric Smelting & Aluminum Company is to be restricted to the manufacture of aluminum alloys, although it may handle and sell aluminum in all forms at the works of the company at Lockport, N. Y. By the terms of this agreement there will be no future litigation between the two companies.

The Electric Smelting & Aluminum Company apparently now controls the present electric smelting industry in the United States, as the following companies are more or less subsidiary to it: The Cowles Smelting Company, the Union Carbide Company, the British Aluminum Company, the Electric Gas Company, the Acetylene Illuminating Company, the Willson Aluminum Company and the Acetylene Company.

There are only three aluminum works in the United States (two at Niagara Falls and one at Massena Springs, N. Y.), one in Quebec, Canada; one in Scotland, two in France, one in Switzerland, one in Germany, and one in Austria.

Trade Literature Received.

Mishelin Tire Co., 132 West 27th street, New York City. Price list and particulars of Michelin tires.

Atwood Manufacturing Co., Amesbury, Mass. Catalogue No. 15, showing the company's product of oil, electric and acetylene lamps for automobile use.

New York & New Jersey Lubricant Co., 14 Church street, New York City. Folder regarding their non-fluid, oils and lubricant gun.

Standard Supply Co., North Adams, Mass. Folder regarding remodeled carburetors.

The Diamond Rubber Co., Akron, Ohio. Catalogue of Diamond solid and single tube tires.

The B. F. Goodrich Co., Akron, Ohio. Folder showing Goodrich tires fitted with Bailey "Won't Slip" tread.

Locomobile Co. of America, Bridgeport, Conn. "A Collection of Letters Received from Users of Locomobile Gasoline Cars."

Wilson & Hayes Manufacturing Co., Detroit, Mich. Illustrated poster showing the hoods, fenders, radiators and other automobile parts manufactured by the company.

J. J. Power, Madison, Wis. Circular of Power's vaporizing valve.

OUR FOREIGN EXCHANGES

The Gaillon Hill-Climbing Trials.

The annual hill-climbing trial on the Gaillon hill along the main route from Paris to Rouen, took place on Sunday, October 30, forming the last out-door automobile event of the season in France. Originally it had been intended to limit entries to racing cars solely, a hill climb for tourists' vehicles having been held by the same organizers a week earlier on the Chateau Thierry hill. However, entries in the different classes for racers coming in very slowly, the organizers reconsidered their original plans and decided to open classes for touring vehicles also, to save the event from proving a failure. The weighing-in took place on Saturday at the freight depot at Vernon. The trials for touring vehicles were held in the forenoon on Sunday, and the trials of racers in the afternoon. The course is a kilometer (.62 miles) in length and has an average gradient of ten per cent. The trials were run with a flying start. Baras (100-h. p. Darracq) and Rigolly (100-h. p. Gobron-Brillié) tied with 29 sec. dead, a speed of 77 miles an hour. The previous record was Rigolly's 33 3-5 sec., 66½ miles an hour. S. F. Edge's six-cylinder 100-h. p. Napier, driven by Arthur Macdonald, was second to the dead-heaters, doing 29 2-5 sec., a speed of 76 miles an hour. Hemery's light Darracq made a record in its class with 32 3-5 sec., 68½ miles an hour. The best touring-car time was that of the Mercedes, 49 sec., 45½ miles an hour. A surprising performance was that of Lanfranchi, on a Peugeot motor-bicycle, weighing less than 110 lbs.; his time was 29 3-5 sec., only 1-5 sec. slower than the Napier. Lanfranchi's mount weighed 108 lbs., the cars of Baras, Macdonald, and Rigolly over 2,100 lbs., and their speeds are almost identical. As a cup was to go to the winner and two cars of rival firms tied for first place, it is considered to arrange a match between them to dispose of the possession of the trophy. The tourist vehicles also did comparatively well. In the class of tourists' motor cycles—that is, machines with less than one-third liter cylinder capacity—in which there were six starters, the three machines at the head of the list of classification were all of the same make, viz., Magali. First place in the class for touring cars from $2,400 to $3,000 was secured by Pelser (Gardner—Serpollet); in the class for cars from $3,000 to $3,600, by Cuchelet (Pevgeot); in the class for cars from $3,600 to $5,000, by Rulot (Gardner-Serpollet), and in the class for cars over $5,000, to Larentie (Mercedes).

GAILLON HILL TRIALS: P. FAURE ON A MERCEDES.

GAILLON HILL TRIALS: DE LA TOULOUBRE ON A DARRACQ.

Care of the Motorist's Hands.

How do you keep your hands clean? This is a very hard question to answer if you are a motor enthusiast. There are several conditions, however, which, if understood, save much trouble in cleansing the hands after motor work. From experience it will have been noticed that the sole reason for motor dirt being hard to remove is the irregularity of surface to which it is applied. Cracks round and under the nails are the most difficult places to clean, next the creases on the fingers and thumb. Given a smooth hand, very little dirt will stick. Therefore, do all that is possible to keep the hands smooth. This is a cardinal point. To do this there are several points to observe—

1. Remove the dirt without roughening the surface.
2. Fill up the interstices of the skin before the work is begun.
3. Avoid chafes, chaps, and rubs, e.g., knocking the skin off the knuckles and exposure to wet and cold.

1. The answer to this question is: Avoid all coarse forms of soap; never scrape the nails with a knife! never use Sapolio, Monkey soap, or an alkaline substance whatever. Do not use gasolene to wash hands in; it coarsens the hands very quickly.
2. Gloves are uncomfortable to work in, so before beginning to work, rub the hands all over with a fine toilet soap, fill the nails and cracks round with it, and avoid contact with water till the job is over.
3. If necessary, wear gloves with the fingers cut out.

TO CLEAN THE HANDS.

Use warm *soft water*, good toilet soap, and a nail-brush for the nails.

Gaillon Hill Trials: A. Clement on a Voiturette.

When it is important to have the hands perfectly free from black, as may be the case with a doctor, do not be too violent in the efforts to cleanse the hands perfectly. It is wonderful how a few hours seem to loosen the dirt.

It has to be remembered that ordinary oil plus metal wearings is purely a mechanical dirt, and does not dye the surface of the skin or in any way enter into chemical combination with it.

Perhaps the most important matter of all to attend to is filling the cracks and nails with soap before starting a job, and not wet them till the job is completed.

"Wear gloves" sounds well, but how many motorists can screw up a fine-threaded nut or cap with gloves on?

Smooth hands do not necessarily blister easily from use. The writer wears gloves and uses glycerine at night, and finds he cleans his hands more easily now than ever, provided he remembers to soap them before he works. Be warned in time; motor grease and oil do not stain, and need crevices to keep in position against the assaults of the finest of toilet soap. Sapolio, sand soap, etc., are excellent for removing paint from the proverbial omnibus, but it won't wash hands more than once. Pumice for the finger pads does no great harm, but is best avoided if possible.—*The Autocar.*

The chocolate works of Stollwerk Bros. in Cologne, Germany, recently acquired two Krieger electric trucks, one for one and a half and the other for four tons load capacity. By means of attachable seats, these can be transformed into omnibuses in a few minutes, to carry workmen from the company's working men colony to the factory morning and evening. One carries eighteen and the other thirty-four men. The wagon batteries are charged at the factory during the night.

At the last meeting of the technical committee of the Automobile Club of France it was decided to publish reports of the committee's work in the Bulletin of the General Automobile Association. On the proposition of M. Mors, the committee decided to define the term "tourists' vehicle," to be used in elaborating rules for a touring competition to be held by the club.

The Italian Minister of Public Works has given his sanction to the establishment of a motor mail line between Polaro, Templo and Sassari on Cardinia, and has accorded the projectors a bonus of 13,000 lire. It is expected that the new line will greatly improve the means of communication in the interior of the island, which at present leave much to be desired.

An endurance contest in which speed will be the deciding factor is being organized to be held between Sydney and Melbourne, Australia, next February, for a cup offered by Mark Foy of Sydney. The distance is 575 miles.

According to a report by the clerk of the London County Council, the number of motor cars and cycles registered by him up to October 22 was 4,643 and 3,222 respectively. The total number of licenses and general identification marks issued up to the same date was 11,404.

The French papers containing notice of Thery's and Bernin's defeat at Empire City track by Barney Oldfield are just at hand, and it is amusing to read the explanations of how it happened, some of the writers waxing quite indignant at what they are pleased to call the unequal match between American machines specially built for track racing and French road racers, as though the Americans had enticed the French drivers into the match by unfair means. No mention of inequality of the competitors was made in the reports of Bernin's victory over Oldfield a week earlier.

The Automobile Mutual Protection Association at a recent meeting resolved: "That this meeting of motor vehicle manufacturers very earnestly represents to the Local Government Board that the commercial vehicle industry of the country, in which branch of automobilism England has, so far, taken a commanding lead, is being jeopardized by the existing uncertainty in respect of the intended regulations to be made by the Local Government Board under Section 12 of the 1903 Motor Car Act, and this meeting most strenuously urges that the said regulations shall be issued with the minimum of further delay."

Gaillon Hill Trials: Passing through a Village en route to the Trials.

LEGISLATIVE AND LEGAL.

A Proposition to License Operators in New York City.

New York, N. Y.—The killing of a woman by an electric brougham on Seventh avenue on November 9, has directed the attention of the city authorities, including Police Commissioner McAdoo, and a number of automobilists to the question of examining and licensing operators. The present State law requires professional chauffeurs to obtain a permit from the Secretary of State and to carry a number on a badge, but no examination is made as to their fitness and nothing is to prevent any one else from operating a car. Commissioner McAdoo stated that he favored a law which would require examining and licensing all users of automobiles and several automobilists of prominence are said to be of the same mind except that they consider it doubtful that a satisfactory examining board could be established.

President Scarritt, of the A. C. A., is recorded as being opposed to the proposition and favors rather the revocation of licenses for reckless driving. He is quoted as having said that "The very drivers who do the most damage would be able to pass the best examinations. Those who cause the most trouble are the dare-devil professional chauffeurs who can shave a stone wall or a truck at a twenty-mile clip without a collision, and these very men would pass the best examination."

The Duty of Pedestrians in Crossing Streets.

Jersey City, N. J.—Through its attorney, John R. Hardin, the New Jersey Automobile and Motor Club took up the case of William I. Fisk, a member, who had been sued by William Fitzgerald for damages for injuries alleged to have been received when he was knocked down by the defendant s automobile. The case was heard by Chief Justice Gummere of the Essex Circuit of the New Jersey Supreme Court.

After testimony by the plaintiff regarding his movements just previous to the accident, in which he stated that a delivery wagon standing by the curb had obstructed his view of a part of the street and that he had stepped from behind it directly in front of the defendant's car, counsel for the club and defendant moved for a non-suit on the ground of contributary negligence. The claim was made for the defendant that the plaintiff was not at the time of the accident exercising that degree of care required of a passenger on foot crossing a *public highway, and was not* using such precaution and care for his own safety as a reasonably prudent man should use under the circumstances disclosed by the evidence.

After argument the motion was granted, the court holding that one who crosses a roadway must use his power of observation to discover approaching vehicles and a reasonable judgment when and how to cross without collision, and that, obstacles temporarily intervening to interfere with or prevent observation, reasonable prudence requires a delay until the requisite observation can be made.

Rochester, N. Y.—Simon August has brought suit against Robert P. Scott of Baltimore, Md., to recover for personal injuries received, and the value of a horse and wagon destroyed in a runaway alleged to have been caused by the defendant's automobile during the St. Louis Tour last summer.

Pittsfield, Mass.—Harry E. Jeffers, who was arrested in Cambridge, N. Y., charged with manslaughter in the first degree on account of the death of Mrs. Lottie Colgrove who was thrown from a carriage when the horse was frightened by the defendant's car, has been released on $1,000 bail, and it is believed that the charge will eventually be dropped as the evidence seems to indicate that defendant was exercising due care at the time.

Columbus, Ohio.—In the case of C. M. Chittenden, the Supreme Court of Ohio has handed down a decision sustaining city ordinances regulating the speed of automobiles. Mr. Chittenden had been fined $25 and costs in a police court for a violation of the Columbus ordinance. He appealed from one court to another on the ground that the ordinace was not valid, until the Supreme Court compelled him to pay the fine.

St. Bernard. La.—The Police Jury have taken up the matter of regulating the use of automobiles on the highway and have appointed a committee to confer with their legal advisers in regard to drawing up a proper ordinance.

Twelve members of the Chicago Automobile Club appeared before Justice Kendall at Oak Park November 7 and entered pleas of guilty to a charge of violating the Oak Park speed ordinance while returning from automobile races held in Harlem, October 10. A fine of $5 and costs was imposed on each and a check for $125, signed by J. A. Chartain, treasurer of the club, was given in payment. Through confusion arising over the failure to obtain the correct number of the machines, the original list of forty-two names was reduced to twelve.

Trials for heavy commercial motor wagons are to be held next year by the A. C. G. B. and I. with the co-operation of the Society of Motor Manufacturers and Traders.

Commercial Vehicle Notes.

An automobile stage line is planned to run between San Fernando, Neb., and the Tonopah gold fields.

A license has been granted to J. J. Bush to conduct an automobile stage line between Boston and Concord, Mass.

The Russian government has ordered a number of track inspection cars from the Olds Motor Works for use in the Siberian Railway.

Street Cleaning Commissioner Woodbury of New York City will open bids on November 17 for two additional automobiles for use in the department. There are two in use at the present time.

The Denver, Col., Omnibus & Cab Co. are planning to establish an automobile omnibus line which will run through the business section and residential districts. They also propose to conduct an automobile livery service.

The Twentieth Century Transfer Co. has been conducting a merchant delivery service in Buffalo, N. Y., since November 1, using light gasoline delivery wagons. It is said that the company will soon add more cars to its equipment.

Frank W. Perry and Edward E. Cole, Taunton, Mass., have organized the Perry & Cole Express Co. and are conducting an automobile express service between Taunton and Providence, R. I., using a gasoline wagon for the purpose.

The Waverley department of the Pope Motor Car Co. have completed the first of a number of heavy electric trucks which they have under construction. The two motor system is employed, with double reduction, viz., by gears to a countershaft and chains to the rear wheels.

The Cleveland & Southwestern Electric Railroad has recently put a gasoline propelled emergency track car into service. It is equipped with ladders and repair supplies and is intended for use when wires are down or other conditions make it impossible to use the electrically propelled cars.

A self-propelled well-boring machine has just been completed for J. A. Yates of Alturas, Modock County, Cal., and will be used in the northern part of that State. Power is furnished by a gasoline engine with double opposed cylinders of 6-inch bore and 8-inch stroke, running at a maximum speed of 800 revolutions per minute.

Among the cities in which the automobile has made the most phenomenal progress the present year is St. Louis. At the beginning of the present season there were about 200 licensed motor vehicles in the city, including the motor-cycle and the truck and transfer machines used by the manufacturing and retail houses. At this time there are close to 800 with the number increasing each day. There are also nearly a score of dealers in the city now, most of them having started in busines only this year.

A Three Thousand Mile Demonstration Run in Great Britain.

In the last trials for light cars in Great Britain, the two Oldsmobiles entered did not make as good records as did the same make of car the year before. One of the two overheated and stalled its engine early in the trials and retired, and the other broke its drive chain on one of the earlier trips, which trifling accident marred its whole performance consisting almost entirely of non-stop runs. The overheating accident must be considered largely the fault of the driver, who should have stopped before the engine stalled. Evidentally with the object of preventing any wrong conclusions being drawn from these trials regarding the reliability of the Oldsmobile, and also with a view of giving ocular proof of the car's running qualities to a considerable portion of the provincial population of the United Kingdom, the British agents of the Olds Motor Works, Messrs. Jarrott & Letts, of London, decided to send two cars, a regular 7 h. p. runabout and a 10 h. p. tonneau, on a 30-day, 3,000-mile circular course through England, Scotland and Ireland. This tour was started upon during the latter part of September and successfully concluded at London early in the morning of October 27. Messrs. Jarrott & Letts inform us that the original schedule was strictly adhered to throughout the tour, and that they consider it a great performance. At the completion of the run the two cars were exhibited for a week at the show-rooms of Messrs. Jarrott & Letts in London, with all wearing parts exposed for examination of their condition.

On the morning of the completion of the tour, a party of automobilists drove from London out the Great North Road a little beyond Barnet, and waited for the arrival of the Oldsmobiles. A little past one o'clock the two cars hove in sight. Whether this early finishing hour was also part of the original schedule we do not know. One of the journalists who attended the completion of the run writes as follows:

"The flayed tires alone bore testimony to the rough nature of the roads traversed during the thirty days; for the rest, when the procession reformed and wended its way to town, I found, as I took the place of one of the brown and seat-weary tourists on the 7 horse-power car (which is the smaller of the twain), that the machine was running as well as when new. Five weeks ago the two cars left London. Since that day they have traversed 3,000 miles, including some of the most trying roads in the British Isles, for in mapping out the route the quality of the highways selected was not known, and many of them proved to be by-roads, with atrocious surfaces and appalling hills. In Ireland the roads were shocking, while in South Wales and Devonshire they were simply mountainous. It is worth mentioning that in Ireland the small car, with its normal gear, climbed St. Patrick's Hill, near Cork, which has a gradient of 1 in 3½. This was not part of the tour, but was a special exhibition to convince a doubting Irishman that if he wished he could drive his car up into his bed-room. What with rain, mud and fog the travelers had a very trying time; in fact, had the condition of things been anticipated the tour would not have been undertaken, for it would have seemed like courting failure. Very few stops have been experienced, and they were of small importance, except the results of two sideslips which occurred at the same time near Bath. The large car went into a ditch, and was hauled out by horses, while the small car charged a wall, and bent the front axle. These episodes, however, reflect no discredit on the vehicles. Only half a dozen punctures were experienced, and the tires were in remarkably good condition. Those on the big car were very little worn, and curiously enough most wear was seen on the rear wheels of the little car, the reason being that there was not sufficient weight on them for complete grip of the roads on the bad hills encountered.

The Two Oldsmobiles at Land's End, the Most Southern Point of England.

Development of the Oil Fields of India.

In a recent British statistical report the statement is made that during the fiscal year ended March 31, 1904, the importation of kerosene oil into India fell off nearly 10,000,000 gallons. During the preceding year there was an almost identical decline, so that, compared with the fiscal year 1901-2, the reduction was nearly 20,000,000 gallons, equal to 21.7 per cent. The decline in the import of Russian oil was 19.4 per cent. and of American oil 27 per cent. The rapid development of the Indian oil fields has caused this decreased import. The Indian oil is not yet of as good quality as most of the imported oil, but its cheapness secures it a market. American oil, it is said, has security for a limited market in it superior quality, but keen competition among all the common grades seems assured.—*Frank W. Mahin, Consul, Nottingham, England.*

Knox Motor Truck Co. Organized.

The Knox Motor Truck Co. has been organized under Massachusetts laws with a capital of $100,000 to manufacture gasoline propelled motor trucks after designs by Harry A. Knox, late of the Knox Automobile Co., of Springfield, Mass. Clarence J. Wetsel, who is treasurer of the new company, now holds a like office in the Baush Machine Tool Co., of Springfield, and Walter S. Pease, who is to be superintendent, was formerly with the Electric Vehicle Co., and later with the Knox Automobile Co.

A tract of land has been bought at the corner of Becket and Hooper streets in Brightwood and plans for a large factory are contemplated. It is expected that the company will occupy the new plant by March 1, 1905. In the meantime the first vehicles will be constructed at the plant of the Baush Machine Tool Co.

New Records Made in Denver.

On November 6 at Cleveland Park, Denver, Col., Barney Oldfield, driving the Peerless "Green Dragon," established new world's track records for from one to eight miles. The former he placed at 52 1-5 sec., in the fourth lap of what was intended to be a fifteen mile trial, but, owing to the failure of the car, was cut short in the ninth mile. His accumulative times were: 53 3-5, 1:46, 2:41, 3:33 1-5, 4:30, 5:25 3-5, 6:18 1-5, 7:13-1-5. The former record for eight miles was 7:21.

North Dakota in Line.

Buckley & Halstead have received the latest and nobbiest thing yet in the automobile line—a regular buggy, rubber-tired, and just the thing for North Dakota roads.—Jamestown (N. D.) Alert.

Club Notes

WORCESTER A. C.

The second annual banquet of the club was held at the Bay State hotel on Friday last. A large gathering was present, among the invited guests being Harlan W. Whipple, C. H. Gillett, Augustus Post and C. J. Glidden. The entertainments of the evening wound up with several numbers of vaudeville performances. In a report in a local daily it is stated that the horse power represented at the banquet was estimated at 2,000.

NEW JERSEY A. & M. C.

Entry blanks have been issued for the 1st annual race meet of the New Jersey Automobile and Motor Club, to be held at Weequahic Park, Saturday, November 19, starting at 1:30 P. M. The prizes will be cups and gold medals. Events of three, five and ten miles are included, all being for stock cars. Entries close November 15 with Charles S. Wells, secretary, 359 Halsey street, Newark.

A. C. A.

The committee which is considering plans and choice of location of the new home of the A. C. A. has held several meetings during the past week, without, however, taking definite action. As the club membership is gaining rapidly, it will be necessary to provide more elaborate quarters than its present needs demand, and hence great deliberation is being exercised in the choice. It is said to be planned to install a dynamometer in the garage, which is to be thoroughly modern in shop and floor facilities and to issue a "certificate of excellence" for cars having been submitted to a satisfactory test.

CHICAGO A. C.

The annual election of officers was held at the Chicago Automobile Club Thursday night, November 10. John Farson was again chosen president, his name appearing on both tickets. I. M. Cobe was elected first vice-president, W. G. Lloyd second vice-president, Sidney S. Gorham secretary, and C. L. Furey treasurer. H. N. Tayor, B. H. Marshall, T. J. Hyman, F. C. Donald, Robert Tarrent, Jr., and D. L. Sage were elected directors. They will meet to-day, Wednesday, to organize.

N. Y. MOTOR CLUB.

The second meeting for organization was held on Wednesday evening, November 9. S. A. Miles presided and L. R. Smith acted as secretary. The name New York Motor Club was finally adopted and a committee consisting of C. H. Hyde, A. L. McMurtry, J. E. Wetmore, I. B. Potter and Frank J. Griffin was appointed to draw up a constitution and by-laws. It was practically decided to fix the dues at $20 per annum *for residents and $10, for non-residents.*

HARTFORD, (CONN.), M. C. C.

The annual meeting was held on November 3 at the club rooms on Mulberry street. The following officers were elected: J. M. O'Malley, president; W. F. Hellmund, vice-president; J. J. O'Connor, secretary; Alexander Smith, treasurer; E. D. Pierce, captain; R. E. McCausland, chairman of the house committee. Plans were discussed for holding a series of weekly talks on the construction of the motor-cycle, in order to educate the members in their proper use. Another run will probably be held before winter.

RHODE ISLAND A. C.

The last club run of the season will be held to River Point, Saturday, November 26, where the club will be entertained by C. Prescott Knight at his farm. There will be the usual hill climbing contest for which several silver cups have been put up for the winners of the four classes, electric, steam, gasoline cars, valued under $1,500, and gasoline cars valued over $1,500.

HUDSON COUNTY A. C.

The club held a run on Election Day from the club rooms on the Boulevard at Duncan avenue, Jersey City, to Nyack, by the way of Fort Lee and Englewood over the Palisade Road. Dinner was served at the St. George Hotel.

BUFFALO A. C.

The proposed change of the club headquarters is delayed owing to the contract with the owners of the present quarters which does not expire until April 1. Preparations are being made for a social event to be held on Thanksgiving Eve. Negotiations are in progress whereby the club will be able to furnish a bond under which every member can go into Canada with his machine, on the Niagara frontier, without any trouble to the auto owner. The negotiations are in charge of Secretary Dal H. Lewis. It is believed a bonding company will be induced to furnish a blanket bond for the entire club.

HOUSTON (TEX.) A. C.

The club has secured the driving track from the Houston Driving Association for the automobile races, to be held on Wednesday, November 23. The automobile clubs throughout the State will be notified of the arrangements. The automobile races will be one of the chief features of the No-Tsu-Oh Carnival.

The Knox Auto Truck Co., recently organized in Springfield, Mass., will manufacture a line of commercial vehicles, from light delivery wagons to heavy trucks, propelled by air-cooled gasoline motors.

The Warwick Automobile Co., of Springfield, Mass., expect to make for the season of 1905 a side entrance tonneau car driven by a three-cylinder, two-cycle motor of 18 h. p. and equipped with a three-speed transmission system with internal expanding clutch. The car is to have a wheel base of 88 inches and will weigh about 1,800 pounds.

New Incorporations.

Harmon Manufacturing and Distributing Co., Chicago.—Capital, $50,000; manufacturing parts. Incorporators, Henry Harmon, Theo. Stensland, Henry W. Hering.

The Automobile Fender Company, Middletown, Conn.—Capital, $20,000. Incorporators, Jason G. Lamison, Americus Miesse, Mary R. Lamison, Blanche M. Fredm and T. C. Calvert.

Pardee-Ullman Co., Chicago: to manufacture motor vehicles. Capital, $25,000; Incorporators, T. A. Parkhurst, F. J. Pardee, J. B. Hess.

Knox Motor Truck Co., Springfield, Mass. Capital, $100,000. Incorporators: Harry A. Knox, Clarence J. Wetsel, Walter S. Pease, Walter R. Weiser.

Regarding the Renault Ignition.

Referring to our recent description of the ignition system on the new Renault cars, we are now able to add that the magneto is of Simms-Bosch make and a direct high tension machine only recently brought out. As is generally known, in the Simms-Bosch magnetos both armature and field are stationary, and the inductive effect is produced by the rotation of two iron segments extending laterally from the opposite arms of a spider mounted in a bearing concentric with the armature, forming a magnetic bridge between the field and the armature core. The stationary armature core is of the shuttle or H type, and has wound on it both a primary and a secondary winding. The primary winding is short circuited upon itself periodically and then opened by a mechanical vibrator operated by the rotating part of the machine. A condenser connected across this vibrator is located in a casing on top of the armature housing, between the two poles of the field magnets. Whenever the primary circuit is broken, a strong electric impulse is induced in the secondary winding which at that moment by means of the high tension commutator is connected to one of the four spark plugs.

The most extravagant claim of fuel economy that has ever come to our notice was contained in a recent letter in which it was stated that the motor, a big single-cylinder one, had continued to drive the car for several miles on the vapor in the gasoline tank after the latter had been emptied of liquid gasoline.

The record ride on the ice of Lake St. Clair by Henry Ford last winter has roused the emulative spirit of the Swedish Automobile Club, and automobile races are to be held by them early next February on a Fjord near Djursholm, about 8 miles north of Stockholm. The arrangements are in charge of Charles Cervin, 9 Villagatan, Stockholm, 5.

MINOR MENTION

Percy H. Johnson, of Newark, N. J., has taken the agency for the Cameron Car.

Automobile races will be held at Dallas, Texas, on Thanksgiving Day.

The Simplex Motor Car Co., capital $20,000, is being organized in Mishawaka, Ind.

L. Lawrence & Co., of Newark, N. J., have recently entered the aluminum body field.

F. E. Edwards opened the Chicago School of Motoring on November 15 at 240 State street, Chicago.

The Moline, Ill., Automobile Co. is receiving bids for the erection of its new factory in East Moline.

The Imperial Wheel Co. have erected a new plant at Flint, Mich., and will abandon their plant at Jackson.

A number of Buffalo and local automobilists participated in the Republican parade at Niagara on November 12.

Fires in garages at Buffalo, N. Y., and Allentown, Pa., have done damage to the amount of $20,000 during the past week.

W. Y. Demies, president of the Yale Realty Co., Minneapolis, Minn., is erecting a garage corner Hennipin avenue and Fourteenth street.

The Dayton, Ohio, Electrical Manufacturing Co. have acquired the right to manufacture and sell the Gray muffler formerly made in Cincinnati.

By the collapse of a wheel of an automobile two women and a chauffeur were thrown out and one woman severely injured at Elizabeth, N. J., last week.

The Tuthill Spring Co., of Chicago, are erecting a new factory on West Polk street which will materially increase their output of automobile and carriage springs.

An arrangement has been made whereby the Importers' Automobile Salon of New York will exhibit in Symphony Hall, Boston, from March 13 to 18, inclusive.

The show of the Buffalo Automobile Trade Association to be held at Convention Hall, Buffalo, March 5 to 11, 1905, has been officially sanctioned by the N. A. A. M.

The Haefer Manufacturing Co., Freeport, Ill., have established a branch of their business at the corner of Chicago and Jackson streets, known as the Freeport Spring Works.

The International Brotherhood of Teamsters have sent out an order to the branches in New York and elsewhere to form unions of automobile drivers affiliated with the Brotherhood.

The Syracuse & South Bay Railroad have purchased a strip of land 100 feet wide along the entire length of their tracks to South Bay which they contemplate using for an automobile speedway.

F. D. Carrico, formerly with the Nordyke & Marmon Co., and the National Motor Vehicle Co., has been appointed superintendent of the automobile department of the Reeves Pulley Co. of Columbus, Ind.

The Maxwell-Briscoe Co. have taken the premises at 317-319 W. 59th street, New York City, where they will install their metropolitan distributing agency, in charge of Col. K. C. Pardee, well known in the automobile business.

The J. Stevens Arms & Tool Co. of Chicopee Falls, Mass., will move their automobile department into the old plant of the Spaulding Co. of that town, on December 1. Extensive alterations in the building are now being made.

The machine shop and automobile garage of John J. Schaadt, in Allentown, Pa., was set on fire by a gasoline explosion on the evening of November 10. The building and contests, including five automobiles, were consumed by the flames inside of an hour.

The Worcester, Mass., Y. M. C. A. will open an automobile school on November 16, Parker H. Kemble will act as superintendent of instruction. The shop work connected with the course will be conducted at the laboratories of the Worcester Polytechnic Institute.

On account of the many applicants for space in the Boston Show, for the purpose of showing second-hand cars (which the association does not allow in the regular show) the management contemplate leasing Horticultural Hall for this purpose during Show week.

A meeting of the general sales agents of the Olds Motor Works at Detroit on Tuesday and Wednesday, November 15 and 16, was announced last week. Agents from all parts of the United States were expected, as well as the London, England, representative of the company.

A large car running wild on Fourteenth street, New York City, on the evening of November 11, struck and knocked down a post which supported a canopy in front of the Dewey Theatre, with the result that the canopy, which weighed several tons, fell and injured four men who were beneath it.

The Staten Island (N. Y.) Rapid Transit Co. have recently issued an order to the effect that no more than four automobiles may be carried on any of the ferryboats at a time and that these must be placed at the stern of the boat, near the edge so that if fire breaks out in any of them it can be pushed overboard easily.

The Virginia Beach Automobile Club has withdrawn from the American Automobile Association. The club was organized to promote racing meets, and made an effort to secure the elimination trials for the American Gordon Bennet entries last season. The beach, it was found, was in no condition for safe racing.

The United States Trust Co., of Kansas City, Mo., have issued $50,000 in bonds to the Smith Automobile Co. on a trust deed conveying the property of the automobile company to the Trust Company. The amount so raised will be used to erect additions to the factory and extend the business of the former concern.

The New York district of the International Association of Machinists is arranging for a mass meeting to organize the employees in the automobile shops. A delegate of the association has been instructed to be on the lookout for the Frenchmen who are brought here for automobile work to find any violations of the contract labor law.

The Boston Dealers' Association held a meeting at the historic "Ferncroft Inn"—30 miles from Boston—on November 11, and appointed a committee of three to arrange for a "Noon-Day Club," with the idea of getting representatives of the trade together as often as posible. Rooms will be secured at one of the hotels in the automobile district.

A limited partnership has been entered into by Charles F. Lighthouse, of New York, and John F. Calder, of Albany, to manufacture automobile number pads and appurtenances, etc., under the firm name of Charles F. Lighthouse & Co., Ltd. The term of the agreement is four years from October 14, 1904, and Lighthouse contributes $2,500 capital.

The Daimler Manufacturing Co., of Long Island City, N. Y., has obtained from its parent company the Daimler Motoren Gessellschaft of Germany the control of all their foreign patents, shop drawings, patterns and materials for the United States and Canada and their 1905 model will, it is said, be an exact reproduction of the 40-45 h. p. car made by the parent company.

An explosion of gasoline in the Utica automobile station, on West Utica street, Buffalo, N. Y., at midnight November 10, resulted in the serious injury of four men and the destruction of seventeen automobiles valued at about $15,000. It is believed that a gasoline tank in the stable had been left uncovered too long and that the fumes of the liquid spread to a stove in the building.

The Wilson & Hayes Manufacturing Co. of Detroit, Mich., will not, as has been erroneously reported, engage in the manufacture of complete cars, but will confine themselves to making hoods, radiators, fenders and other metal specialties for automobile use. The new officers of the company are: T. H. Wilson, president; Herbert P. Carrow, secretary; H. Jay Hayes, treasurer and manager.

A party of aldermen with the road commissioner and chief of police of West Orange, N. J., were driven up Eagle Rock Hill recently in order to determine what improvements should be made before the hill climbing contest which will be held there on Thanksgiving Day. The more dangerous curves will be banked and roped off and policemen will be stationed at intervals along the course to ensure the safety of spectators.

MOTOR VEHICLE PATENTS.

United States Patents.

774,556. Automobile.—F. B. Brack, of Washington, D. C. November 8, 1904. Filed April 11, 1904.

The problem of guarding against the freezing of the jacket water in a gasolene automobile during cold weather is a most appealing one. Many remedies have been offered, but up to this time all effort has been directed toward lowering the freezing point of the liquid by chemical means. This invention is the first solution yet offered which presents a purely mechanical method. The primary claim of the patentee is based on the introduction of an auxiliary heater into the cooling system to be used at such time as the water is in danger of freezing. To insure the circulation of currents of warm air from the burner, which is placed at the base of the radiator, to all parts of the engine and radiator, the head and cooler are provided with means for enclosing them with movable slats or some other device, so that the whole engine may be tightly enclosed at will. The water in the cylinder jackets and the other parts of the system is kept at a reasonable temperature by thermal circulation.

774,186. Piston.—John S. Ladd, of Boston, Mass. November 8, 1904. Filed June 25, 1904.

The ordinary methods of securing the wrist-pin to a piston, by means of set screws, give more or less trouble, owing to the danger of the screws breaking or working out. In the device here shown that danger is avoided, and the pin securely locked in place at the same time.

The pin is split at both ends, and bored and tapped to receive taper screws which expand it into the piston and hold it with absolute security. The heads of the screws are slotted to receive a piston-ring which surround the piston in the place of the wrist-pin. This prevents the screws from backing out, and at the same time, were the pin to break, would tend to prevent the broken part from working outward and injuring the bore of the cylinder.

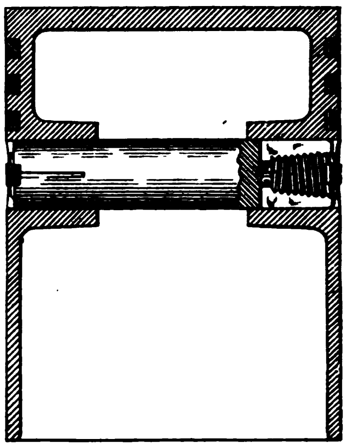
774,246. Traction Attachment for Vehicles.—Alexis W. Herrick, of Buffalo, N. Y. November 8, 1904. Filed July 13, 1904.

Various inventions for increasing the traction of motor vehicles have been introduced to the public, the two-fold object of increasing the tractive effort of the driving wheels and reducing the liability to skidding being attained in a more or less satisfactory degree. In this invention the end is accomplished by means of radial prongs carried by the wheels, and capable of being extended beyond their periphery at the will of the operator. In this way the resiliency of the tire is available at all times except when an added grip is needed because of adverse road conditions.

The prongs, which are fitted to slotted guides carried on the rim and spokes of the wheel, are drawn in and out by pivoted levers or dogs which are carried by lugs on the hubs of the wheels. These are compressed or allowed to expand simultaneously by means of a hollow cone which rides on the end of the axle, and is moved in or out by means of suitable linkage connecting it with a lever near the driver's seat. Provision is made against friction, by constructing the core in two parts. One, which is splined to the axle, is slotted to receive a fork from which motion to engage or disengage the prongs is obtained. The other part, which is the cone proper, rides on ball bearings suitably adapted to receive the thrust and shock caused by the road strains on the vehicle.

774,392. Explosive Engine.—Robert Miller, New York, N. Y. Filed September 14, 1903.

774,411. Vehicle Wheel.—Henry W. Adams, Jr., Chicago, Ill. Filed March 16, 1904.



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774,432. Spark Plug.—Edward B. Jacobson, West Somerville, Mass. Filed September 4, 1901.

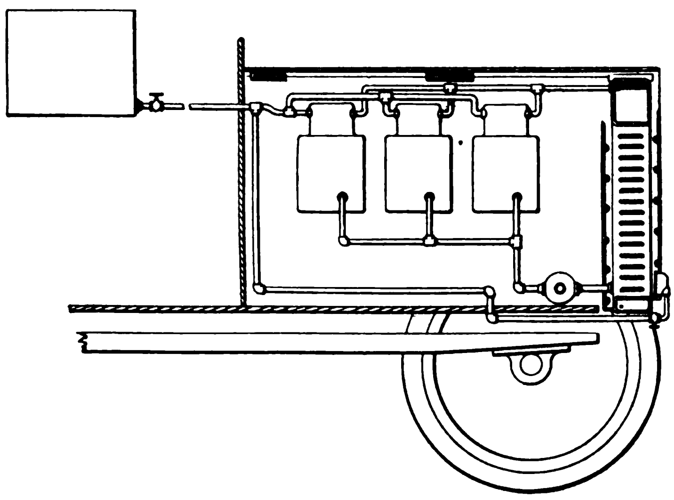
774,433. Steam Engine.—Daniel E. Johnson, Hartford, Conn. Filed August 4, 1902.

774,434. Steam Engine.—Daniel E. Johnson, Hartford, Conn. November 8, 1904. Filed November 27, 1903.

774,685. Vehicle Drop Brake.—Charles A. Miller, Hazleton, Pa. November 8, 1904. Filed May 17, 1904.

774,727. Process of Reclaiming and Regenerating Rubber.—Ludwig T. Petersen, Akron, Ohio. November 8, 1904. Filed June 24, 1904.

The Diamond Rubber Co., of Akron, Ohio, are now manufacturing an endless solid tire for heavy vehicles. It is of side wire construction, short wires running crosswise of the tires are vulcanized within the rubber near the tire's inner circumference, and the side wires, which are sprung into place to hold the tire in position, overlap the ends of these and securely bind the rubber within the channel.



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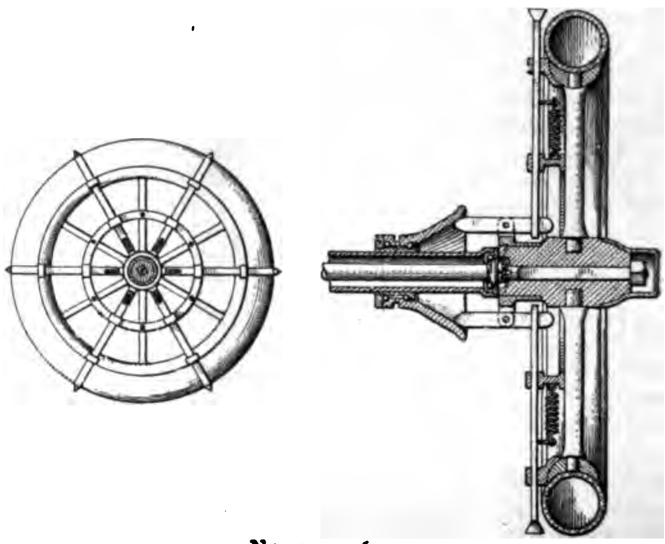

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Devoted to Motor Interests

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THE HORSELESS AGE

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Importer's Salon Secession.

During the past week it was announced that a number of leading importers of cars had taken space at the Madison Square Garden show, and would therefore not exhibit at the Importers' Salon, as the management of the Madison Square show makes it a strict rule that all exhibitors there must not exhibit at any unsanctioned exhibition. When the Importers' Salon was first announced, we stated in these columns that if a division of exhibits were necessary owing to lack of sufficient floor space in the Madison Square Garden building, one into American and foreign made cars would be the most rational, as it would be productive of the least inconvenience to show visitors. It seems, however, that any division of exhibits must always be more or less detrimental to exhibitors at the smaller show, especially if there is considerable difference in the size of the two.

When the Importers Salon' was first organized it was naturally expected that it would be joined in by all the importing firms, and in early published statements of the probable exhibits about all the foreign cars represented in this country were mentioned. Then the bugaboo of the non-sanctioned show boycott was raised, and importers came to realize that if they patronized the Salon they would be barred from all sanctioned local shows. This rule of the N. A. A .M. against unsanctioned shows has been in force for several years, and the Association can therefore hardly be accused of having made an offensive move against the Salon, the boycott applying, moreover, to all unsanctioned shows, and not especially to that of the importers. This accusation was made, however, by the management of the Salon, who threatened to retaliate by taking into the Salon a select few of American manufacturers, making it an exhibition of quality, and leaving the Madison Square affair an exhibit notable only for its size. Since this retaliatory move, more or less strife has been manifest between the two show managements. In the past, few foreign cars have been exhibited at any but the New York show, but to judge from the agitation among importers over the N. A. A. M. boycott against unsanctioned shows, quite a number of the larger importing firms expected to exhibit at the more important local shows this season, particularly at Boston and Philadelphia.

Meanwhile exporters were not excluded from the Madison Square Garden show, but were even offered floor space in the main hall, between American exhibitors, instead of being confined to the restaurant as last year. The importing firms not directly interested in the organization of the Automobile Salon were therefore given the choice of taking space at the Madison Square Garden show (which will undoubtedly draw a far greater attendance), and enjoying the privilege of exhibiting at any local exhibition they choose, or participating in the special show for foreign cars and being barred from all local sanctioned shows. To partly offset the disadvantage of being barred from local shows, the management of the Importers' Salon has recently rented a hall in Boston for holding a show of imported and other cars. But even this inducement, it seems, was insufficient to bring all importers into the Salon, and space for about a half-dozen leading foreign makes has already been taken at the Madison Square Garden. With this division among importers in show matters, the chances of success of the Salon have unmistakably shrunk.

Classification of Cars.

The deep line of demarkation which until recently separated the cheap and light runabout class from the big, powerful tour-

ing cars has almost entirely disappeared, and cars may now be bought at practically any price from $500 to $5,000. It is obviously desirable to classify in some manner the large variety of styles and forms of construction, but classification, except on the basis of price, is practically impossible. Of course, the number of cylinders generally increases with the price, and sliding gears are more common on the more expensive, and planetary gears on the lower priced cars, but classification on this basis would be very unsatisfactory, as there are too many and important exceptions to these rules. For instance, while the sliding gear transmission generally goes with the more expensive type of car, it is also found, in one instance at least, on a car selling at less than $1,000, while the planetary gear, besides its almost universal use on light runabouts, is used also on several $2,000 cars. Consequently, if any classification is to be attempted, it must be on the basis of price, as is already the practice in touring car competitions both here and abroad.

After due consideration, we have reached the conclusion that the following classification best fits the conditions:

Class I, cars selling at $500—850;

Class II, cars selling at $900—1,350;

Class III, cars selling at $1,500—2,200;

Class IV, cars selling at $2,500 and over.

The first of these classes includes practically all single cylinder runabouts and some single and double cylinder tonneau machines, some as high as 10 nominal horse power. The second class is rather heterogeneous, but will consist chiefly of two-cylinder touring cars, some quite big and powerful, and others of the smaller type but of superior quality. This class will undoubtedly meet the needs of the greatest number of purchasers—all those who require a four-passenger car with a surplus of power, but who are limited to a comparatively low price; also those who want a runabout of superior merit, although few runabouts will exceed $900 in price. The third class will include almost exclusively 4-cylinder touring cars of comparatively light and simple construction, and will also attract a large number of buyers, certainly a far greater percentage of the total than have bought cars within this range of price before. The fourth class, finally, is a class of luxurious touring cars and will be bought by a comparatively small class—those who appreciate high quality of mechanical work and *who can afford* to pay for it.

As a mere estimate we should say that 20 per cent. of all cars that will be sold next year will be of Class I; 50 per cent. of Class II; 25 per cent. of Class III, and 5 per cent. of Class IV.

It may be observed that Class II has been developed from Class I, as a result of the demand of users of Class I machines for something better—i. e., either more powerful, more roomy and comfortable, or of better mechanical workmanship. Similarly, Class III has been developed from Class IV to meet the need of lower prices in order to extend the market for this general type of car. Thus the former large gap between big touring cars and small runabouts has been entirely filled up, and practically every purse, as well as every taste, can now be suited.

Three-Point Suspension.

Of late the three-point support for engines and gear cases on running gear frames seems to be considerably gaining in favor among designers. Patents on particular arrangements have recently been issued in this country and in England, and at least one prominent French car is known to embody this feature. When a front vertical engine is thus supported, its crank case is formed with two sidewardly extending arms fastened to the main frame bars, and with a bracket near the front crank bearing, which rests on the front cross member of the frame. On a gear case the arrangement is usually reversed; that is, the two sidewardly extending arms are at the front end of the case, and the central bracket resting on a frame cross member is at the rear.

The general advantage of a three-point support over the usual four-point support is that it reduces the strains on the supporting arm or brackets of the casing, and on the casings themselves, and consequently admits of a considerable saving in weight. The reduction of these strains is particularly important, as the parts sustaining them are nearly always of aluminum, a metal of only moderate tenacity.

The advantage of a three-point support is perhaps best illustrated by the example of a three-legged stool. Such a stool will stand firmly on almost any ground, however uneven, while a four-legged stool with legs of equal length will be shaky on any but an even floor. During use an automobile frame is wrenched out of shape more or less, and may then be compared to an uneven floor on which a four-legged stool will not stand firmly; that is to say, if all the arms of the casing were not bolted firmly to the frame, the frame would sag away from one or two of them. As things are, it is impossible for the arms to separate from the frame, but instead very severe strains are set up in the arms, and if they are not heavily ribbed they may break—an accident not at all uncommon on high-powered cars.

With a three-point support, however, a machinery case unfastened would always rest on all three arms or brackets, however much the frame might be twisted out of shape, and when the brackets are bolted down the only strain on them is that due to their square seat on the frame, which can be made quite small by suitably forming the bearing surfaces of the supports.

Of course, with three-point supports the engine and transmission will get out of line easier, as the casings do not add to the stiffness of the frame, but this can easily be provided for by introducing Oldham couplings between engine and gear box, and in the countershaft.

Anti-Friction Bearings for Transmission Shafts.

The reduction of frictional losses in speed changing gears, and the improvement of their efficiencies of transmission, are matters which rightly demand serious attention upon the part of designers, as a reduction in the rate of wear of the gear shafts and bearings and the realization of a greater proportion of the engine power at the driving wheels results from any improvement in this direction.

Although ball and roller bearings have been used from the earliest inception of the automobile art in this country in wheels and axles, these anti-friction bearings are just beginning to be applied to the gear shafts of a very few high grade American machines. Certain makers of imported cars of the highest repute have, for some time, employed ball bearings upon their gear shafts with most flattering results, and it may be regarded as a good sign that the practice is beginning to become current in this country. A ball bearing when employed upon a driving axle is called upon to withstand not only the pressure corresponding to the tractive effort of the vehicle wheels, but also the crushing stresses

due to the load carried, which latter partakes somewhat of the severe character of a suddenly applied force when the car is operating at speed over rough roads. Such a bearing, on the other hand, when employed upon a gear shaft may operate under very light pressure, as, for instance, when the power is transmitted by direct drive from the engine to the axle through universal joints; or it may be subjected to moderate pressure, when the power is transmitted through one or more intermediate gear shafts and not directly by a through drive but under no circumstances do the bearing pressures of the gear shafts compare in magnitude or fluctuations of their intensity with axle pressure.

It can, therefore, hardly be doubted that, if ball bearings are found to be a safe proposition upon driving axles, they will prove so in a more eminent degree upon change speed and transmission shafts. Indeed, it may be considered a little remarkable that their general use for the latter purpose has not become general long since, as a more efficient substitute for the bronze bushed, plain bearing so commonly used. The latter type soon loses its accuracy of fit through wear, and cannot, as a rule, be adjusted, but must be fitted with new bushings from time to time. The ball bearing may readily be adjusted, although it very seldom requires it, and as when used upon change speed shafts it would be plentifully supplied with lubricant, it should operate under very favorable conditions and effect a very noticeable saving of power over plain bearings, especially in cases of considerable bearing pressures.

Direct Drive Not Adapted for Gasoline Business Wagons.

Most of the commercial vehicles which have lately been adopted for delivery service or for light trucking have been produced by adapting bodies suited to business purposes to chasses designed for pleasure vehicles. The running gears, speed changing and transmission devices thus made use of for commercial service are those which were intended for the speeds demanded in runabout or touring service, and when these chasses have been fitted with delivery bodies or truck platforms, the driving wheels have generally been geared down considerably, or even to the extreme limits of which the designs were susceptible, in an attempt to meet the requirements of low speed, heavy load service under urban conditions.

Horizontal engines, two-speed planetary speed-changing devices with direct drive upon the high speed and single chain transmission to live axles have characterized the popular makes of business wagons of this class, and although they have in many instances been geared down to the limit, practice seems to show that they are too fast upon the direct drive to suit the heavier grade of service, at least, to which they are applied, as their maximum speeds are far in excess of the legal limit, and their load-carrying ability much less than it would necessarily be with a diminished speed capability.

It is hardly practicable to secure a greater reduction between the engine shaft and the rear axle than one to four, owing to limits which expediency sets to the sizes of the front and rear sprockets, as the minimum number of teeth on the forward one cannot well be less than 10 and the maximum number of teeth of the rear sprocket cannot safely exceed 40, as this allows but 6½ inches road clearance when used with a 32-inch wheel, and assuming that a heavy chain of large pitch is employed.

If the engine of such a vehicle runs up to 850 revolutions per minute, when delivering its full power, as it may reasonably be expected to do, the vehicle speed will be twenty miles per hour if equipped with 32-inch wheels—a rate which it would seem ought not to be allowed to the operator of a delivery wagon intended for service on city streets and carrying a heavy load. If the full power of such an engine as here assumed was so arranged as to drive the car at a maximum speed of ten or twelve miles an hour, it would prove sufficient to draw more than twice the load that it would handle under the conditions above specified.

It would therefore seem that the direct drive from a planetary change speed gear through a single chain is not applicable, as a general method, to city delivery work which contemplates the moving of loads of considerable magnitude, on account of its furnishing too slight a reduction of gear between the engine and drive wheels.

The danger of accident to vehicles, the operation of which have high speeds at their command; the annoyance of possible conflicts with the speed laws, and the realization which will probably come to the owners of such cars concerning the expensiveness of high speeds over rough pavements, are considerations which may be expected to lead to the gearing down of business vehicles to maximum speeds much lower than those of which they are now ordinarily capable.

It seems rather evident that a speed reduction other than that obtainable through sprocket ratio must be supplied to these vehicles. This may be obtained by the use of a change speed gear of the Panhard type, in which one pair of gears, possessing any desired reduction ratio, is always interposed between the engine and the driving sprocket. By this means, the speed of the countershaft carrying the two driving sprockets giving motion to the rear wheels, would be so reduced as to render the rest of the speed reduction well within the capabilities of the sprocket ratio. There are other methods, no doubt, by means of which the desired speed reduction could be obtained, but it can hardly be doubted that a double reduction method of some sort will have to be resorted to as a substitute for the present method upon most vehicles of this class.

Reimported Automobiles Dutiable.

In the matter of the protest of J. T. Millhouse, Board No. 3 of the United States General Appraiser has decided that the automobile concerned, which is valued at $2,000 and assessed at 45 per cent. ad valorem, is dutiable. The protest against duty charges was based upon sections 483 and 504 of the Tariff Act and upon the claim that the automobile was imported in February, 1902; exported in August, 1903, and reimported in May, 1904.

In the opinion of the Board, which was written by Judge Somerville, there is no evidence that the car is of American manufacture, and while it might, under the law, be regarded as a household effect, it had not been in use abroad for one year, the period required to make its entry free of duty possible. It was held that the length of time during which it had been used by the present owner in the United States had no bearing on the case. The evidence showed, the opinion states, that repairs, amounting to $500 had been made to it while abroad, and as section 483 expressly provides that exemption from duty can only be extended to goods not advanced in value by any means while abroad, this fact alone would be sufficient to prevent its entry free of duty. It was further pointed out that the federal courts had repeatedly ruled that the reimportation of an article is a new importation and duty can be assessed accordingly. The protest was overruled.

The Use of Electrical Measuring Instruments with Gasoline Cars.

By Albert L. Clough.

Unless a gasoline automobile be equipped with a trustworthy supply of electrical energy from primary or storage batteries or from a good dynamo or magneto, its ignition will prove unreliable or even ineffective, and its performance will be entirely discreditable.

A general recognition of this fact has aroused a general desire among automobile users for handy means of testing their batteries, and has resulted in the placing upon the market of quite a variety of electrical instruments designed to be conveniently used for this purpose. These instruments now form a part of the equipment of a great many progressive motorists, but there may be some readers of The Horseless Age who do not understand the advantages in which their use results, or just how to use them.

VOLTS AND AMPERES.

A battery or other source of electricity possesses a certain tendency to cause electricity to flow—that is, an electrical pressure. This may be likened to the pressure or "head" of water contained in an elevated tank or reservoir. This electrical pressure which the battery possesses causes no electricity to flow so long as no path is provided along which the current can travel; that is, so long as no wire or other conductor connects the carbon and zinc poles of the battery between which the electrical pressure, due to the chemicals of the battery, is acting. Water pressure does not act to produce a flow of the liquid, until a faucet is opened, and a battery cell which is on "open circuit," without a conducting path of wire or other apparatus, from one pole to the other, may be likened to a water pipe with its faucets closed. When, however, the zinc and carbon poles of a battery are connected by a continuous conductor, such as wire or other metallic bodies, electricity passes through this "closed circuit" from one pole of the battery to the other, and the strength of the current or the rate of supply of electricity is proportional to the freedom with which the wire and other parts of the closed circuit will allow it to pass, or, in other words, the current is proportional to the "smallness" of the resistance offered by the wire, the battery cell and other portions of the closed circuit. In a similar manner, the rate of flow of water under pressure is proportional to the freedom with which it can pass through faucets and pipes and to the lack of frictional resistances due to small or rusty pipes and nearly closed faucets. The water pressure, which would be measured in pounds per square inch, corresponds roughly to the electrical pressure in volts, and the current of water which might be measured in gallons per minute, may be regarded as analogous to the electric current which is measured in amperes. The instrument which measures the electrical pressure is the voltmeter, and that which shows the volume of the current or the rate of flow of electricity is called the amperemeter or ammeter. When the two instruments are combined in a single case, the combination is called a volt-ammeter.

PRINCIPLE OF ACTION OF INSTRUMENTS.

When an electric current is passed through a wire wound about a piece of soft iron this iron becomes a magnet, of a strength nearly proportional to the current passing about it, and this magnet may be made to attract against the action of a spring, a small pivoted piece of soft iron which carries a pointer moving over a scale and graduated in divisions which may be so proportioned as to represent amperes flowing in the wire, or the pressure in volts which are applied to it. Or, as is more often the case, the coil of wire may be used without its soft iron core and a small pivoted piece of soft iron so arranged as to be drawn into the wire coil by the magnetism due to the current to be measured against the pull of a spring. The moving soft iron portion is, of course, provided with a pointer moving over a graduated scale. An instrument of this construction is said to be of the solenoid type, and the greater part of the packet instruments provided for automobilists are of this kind.

DIFFERENCE BETWEEN AMMETER AND VOLTMETER.

The coil of the ammeter consists of a few turns of very coarse wire and offers practically no resistance to the passage of current, so that when the instrument is connected by means of good conducting wires to the poles of a battery cell, the current which flows is practically the greatest that the cell is capable of furnishing, and may be regarded as its maximum current on "short circuit," that is, through a circuit of practically no resistance except that due to the materials of which the cell is composed.

On the other hand, the coil of the voltmeter is composed of a large number of turns of very fine wire and, when connected to the poles of a battery cell, offers so great a resistance or obstruction to the electrical pressure that only a very minute current flows. The current which does flow is, however, in proportion to the electrical pressure or voltage, as is also the magnetic attraction of the coil within the instrument, which thus can be graduated to read in volts.

COMBINATION INSTRUMENTS.

Within the volt-ammeter there are two coils which act upon the same pivoted armature of soft iron—an ammeter coil of a few coarse turns, and a voltmeter coil of many fine turns. These two coils are usually connected together at one end to a common terminal and their free ends brought out to separate terminals. Most of these measuring instruments intended for automobile use are made in watch-case form of a size convenient for the pocket, and while by no means to be regarded as instruments of precision, are, if carefully used, sufficiently accurate for the rough measurements required, and, if their readings cannot always be regarded as of absolute value, they are still of value for purposes of comparison. The ammeters vary in range from 0 to 15 amperes to 0 to 30 amperes with 1 ampere scale divisions; and the voltmeters from 0 to 3 volts to 0 to 10 volts. A volt-ammeter of this class may have ranges of 0 to 20 amperes and 0 to 5 volts.

CONNECTIONS OF INSTRUMENTS.

The ammeters require to be connected to the circuit by a conductor of good electrical conductivity, as a considerable current is to pass, and these instruments are generally provided with a permanently attached flexible, insulated cord of high carrying capacity terminating in a metallic connection pin which is touched to one pole of the cell or circuit which is to be tested. The other terminal of the instrument is frequently a metal pin or spur which protrudes from the case and to which one end of the ammeter coil is connected, its other end going to the flexible conductor. When the tip of the flexible cord and the spur on the instrument case are in simultaneous contact with the two poles of the battery cell or circuit, a reading in amperes should be obtained.

As the pocket voltmeter passes so slight a current, no special precautions need be taken to provide it with leads of high conductivity, and it is usually fitted only with screw binding posts for the reception of ordinary wires.

The volt-ammeter usually carries a flexible, highly conducting cord with metal tip terminal and the case bears two spurs which correspond respectively to the ampereage and voltage coils; or it may be provided with two flexible cords normally connecting the voltage coil and a push button which gives connection to the ampere coil. A single scale with two sets of graduations, corresponding to volts and amperes, is employed upon this instrument. With meters of the solenoid type, it makes no difference which of the two terminals—the cord or the spur—is connected to the carbon pole of the cell and which to the zinc, but with instruments (used to a small extent) which employ a permanent magnet in their construction, the proper terminals have to be connected to the carbon and to the zinc respectively, in order to secure a reading. These instruments, if they are to give reliable service, must be carefully handled and not placed loosely in the tool box to be battered by wrenches and other heavy objects.

AMMETER BEST FOR DRY BATTERIES.

Of the two instruments—the voltmeter and the ammeter—the latter is by far the

more useful, and if only one is bought, the ammeter should be the one selected. The volt-ammeter, of course, makes a very useful combination, but the voltmeter alone is not of very great service to the user of primary batteries.

TESTING CELLS AT PURCHASE.

One of the first uses to which the automobilist is likely to put his instruments is in the selection of dry cells from the electrical supply dealer. The ammeter will assist him in selecting cells from the dealer's stock which are in good condition; *i.e.* not deteriorated by age, weakened by accidental short-circuting or previous use, or rendered useless by careless handling. A 2½-inch by 6-inch dry cell ought to show about 12 amperes on the ammeter during a momentary test. This figure is by no means exact, as cells of this size are intentionally made to have different resistances for use under different circumstances, but a cell of this size which shows less than ten amperes should hardly be accepted for automobile work, while as high ampereages as 14 or 16 are not unattainable with cells of this size. The larger size of dry cell (3¾ x 8 inches) should give an amperage in the neighborhood of twenty. A test of this sort is easily made. A number of cells may be placed upon the counter, the ammeter held in one hand and the tip of the flexible cord in the other and the cord tip and the spur or projecting pin of the instrument simultaneously brought into firm contact with bright portions of the zinc and carbon connections of each cell, and the instrument read just as soon as the needle is substantially at rest. The cells which show the highest reading will naturally be chosen. If a voltmeter test be made of a number of cells taken at random, a good instrument will show each of them to have an electrical pressure of very nearly 1.5 volts, and this figure is very little reduced, although the cell may be nearly exhausted, when it is not likely to test less than 1.2 volts. A cell may, under certain conditions, test 1.5 volts and still be incapable of furnishing a current of any practical volume, and it is thus evident that a voltmeter test is no safe criterion to apply to the acceptance or rejection of dry cells. What the automobilist most wishes to be assured of, is whether a cell will actually deliver a good volume of current, and of this an ammeter test assures him, but a cell which might test 1.5 volts by the voltmeter might contain within it a bad connection of the binding post to the zinc or carbon, or perchance the chemicals in the cell might have nearly dried out, so as to offer a great or nearly total obstruction to the flow of current. In either case the usefulness of the cell would be practically nil, notwithstanding the electrical pressure which actually existed within it.

VOLTMETER FOR STORAGE BATTERIES.

The case of the automobile user who employs storage cells for ignition is entirely different. The ammeter is of practically no value to him, as a storage cell will deliver a larger current than the instrument will measure, and these pocket instruments should not be connected to accumulators, for more than one reason. The condition of a storage cell is determined by use of the voltmeter. When a cell has been used until its voltage is reduced to about 1.7 volts, it should be recharged until it shows about 2.3 volts or slightly over. If these figures are not found correct for some particular type of accumulator, the user will soon determine by experience what are the correct ones in his particular case.

TESTS OF INDIVIDUAL CELLS.

Another use which may be made of the ammeter is in the occasional testing of the individual cells after they are in service in the battery of the machine. This test is made exactly as is the test of separate cells at the time they are bought. After considerable use, the cells will be found to show a materially lessened ampereage under test, and the question arises at what point of the progressive diminution of current output the cell should be discarded. This will depend somewhat upon the current which the coil requires for its successful operation and upon the condition of the reserve battery, which must be relied upon in the event of the failure of the one under consideration.

If the spare battery is in first-rate condition, one may be justified in running the other battery nearer to the point of exhaustion than under other circumstances. In a battery which is to be kept in thoroughly reliable condition, one may perhaps not be far wrong in discarding a cell when its ampereage has fallen to about 5 amperes, although this figure is by no means absolute. No doubt, cells exhausted to this point, are capable of some more service, especially if they are used in parallel groups, as then they are called upon to deliver only one-half of the current which would be demanded when used in a single series.

PARALLELING BATTERIES.

To put the two sets in parallel, it is only necessary to connect by a short wire the two battery binding posts from which the wires run to the switch, when the two sets of cells are in parallel, no matter upon which switch point the switch lever is placed. Half the current passing to the coil flows from each set of cells, thus reducing the work required of each.

The chemicals contained in dry cells are designed to cause reactions which tend toward the maintenance of a continual supply of electricity independent of the amount which is withdrawn, but as a matter of fact, if a large current is demanded for any length of time, or if a current of any considerable volume is supplied nearly continuously for a long time, the chemical reactions prove inadequate and the current flowing becomes weak or nearly ceases. This partial or total failure of the cell as a source of electricity is termed polarization, and it may be but a temporary condition which is removed after the cells have had a period of rest.

After a cell has been used considerably, it is more prone to polarize, and will become polarized after a shorter period of use, or upon the withdrawal of a smaller amount of electrical energy, than when the cell was fresh.

PECULIARITIES OF DRY CELLS.

Sometimes, although a cell which has been inactive may show a good ampereage when tested, after it has been used for a short time the current will be found to have diminished to a very small volume. A cell that is in this condition is very untrustworthy for any sort of severe service. Some idea as to whether the battery on a car is subject to excessive polarization may be obtained by taking an ampere reading from each cell both before and after a trip of considerable length. Some cells will very likely be found weaker than others, upon the final test, and if any are to be discarded these should be the ones.

CURRENT CONSUMPTION OF COILS.

Just how low the current should be allowed to run in the primary circuit of the coil depends too much on circumstances to make an exact answer possible. Under ordinary conditions it may be considered inadvisable to allow it to fall below, say, 6 amperes. The volume of this current is readily determined by means of the ammeter, as follows: Place the engine upon the "center," so that the timer closes the circuit, and, in case the coil is of the vibrator type, close the switch on the battery which is to be tested; then touch the respective terminals of the ammeter firmly, one to the support of the vibrator and the other to the support which carries the vibrator contact screw; this will cut out the vibrator and give a reading for the full primary current. If the coil has no vibrator, set the timer "on center," leave the switch open and touch the terminals of the ammeter respectively to the switch lever (or common point of the switch) and the battery point corresponding to the set to be tested.

The ammeter may conveniently be used for locating accidental breaks in the continuity of the primary circuit. Some of the most common forms in which this source of trouble manifests itself are enumerated in an article entitled "Locating and Remedying Spark Troubles" which appeared in these columns on September 14th and September 21st of the current year.

If the primary circuit is closed, except at the accidental break, the ammeter will show the flow of a current when its terminals are simultaneously connected to points in the circuit which include the break, and when an indication of the instrument is obtained, one may know that the defect has been located, at least approximately.

Transmission Gears—Safe Working Stress.

By Thos. J. Fay, E.E.

As the pitch line velocity of a gear increases, the safe working stress, in pounds per square inch, decreases. It is reasonable to assume that, for speeds less than 100 feet per. minute, the effect of speed is scarcely worth noting, but as the speed is increased above this point, all authorities agree that the value of the metal decreases quite rapidly and must be reckoned with, else the result will be *"pour passer le temps."* If we assume that 40 to 50 carbon steel, hammered and hardened, has a safe tensile strength of 40,000 pounds per square inch quiescent load, then, it is believed, the effect of speed will be about as indicated by the following formula, viz.:

$$S. = \frac{4000}{\sqrt{1+0.50V}} = \text{Equivalent Safe Stress.}$$

in which V is the pitch line velocity in feet per minute. This formula is a modification of the formula by Prof. Harkness. The tabular valves obtained by means of this formula are as follows:

PITCH-LINE VELOCITY IN FEET PER MINUTE	EQUIVALENT SAFE WORKING STRESS IN POUNDS PER SQ. IN.
100	33,058
200	27,698
300	25,316
400	22,988
500	21,333
600	20,000
700	18,778
800	17,857
900	17,021
1,000	16,260

NOTE.—In motor car work the pitch line velocity should not exceed 1,000 feet per minute in any case.

Using these values, we may note, for illustration, that a low speed pinion on the driving shaft of a motor car will stand a load as follows: Assuming 18 teeth 5 pitch, the pitch diameter is $18/5 = 3.6$ inches and the pitch circle is $\frac{3.6 \times 3.1416}{12} = 0.942$ foot in circumference, hence the pitch line velocity is 942 feet per minute for 1,000 revolutions per minute of the driving shaft. Hence the safe working stress is

$$1 + \frac{4000}{\sqrt{0.5 \times 942}} = 16666$$

in pounds per square inch

Having thus established the safe working stress in the metal under consideration, we may now proceed with the discussion of the utilization of the same: Slater Lewis states that $W = S\,P\,F\,Y =$ safe pull in pounds, in which S is the safe working stress in pounds per square inch; P, the circular pitch of gear teeth; F, face of gear in inches, and Y, a factor depending upon the obliquity and number of teeth in the gear. Lewis deduced constants representing these Y values, and used them in connection with his formula. The following are revised constants—by the writer—taking into account the effect of hardening, thus making it possible to apply this excellent method in connection with motor car transmission gears, the constants of Lewis being available for use only when reference is had to cast iron and steel gears not hardened, hence not so capable as hardened gears.

No. of Teeth.	Y.	No. of Teeth.	Y.
14	0.090	29	0.1273
15	0.093	30	0.128
16	0.096	32	0.129
17	0.100	34	0.130
18	0.1035	36	0.132
19	0.019	38	0.134
20	0.113	40	0.136
21	0.115	45	0.138
22	0.1165	50	0.140
23	0.118	60	0.1425
24	0.119	75	0.145
25	0.120	100	0.1475
26	0.1225	125	0.1487
27	0.125	150	0.150
28	0.1265		

NOTE.—This table is limited in its application to hammered and hardened, 40 to 50 carbon steel, the same to be, in ever respect, the best obtainable.

Having thus set down a method by which the ability of a gear may be estimated, a concrete illustration of the method may not be out of place. Taking again the 18-tooth 5 diametral pitch pinion, at 1,000 revolutions per minute, we have:

$$W = S\,P\,F\,Y = \text{pull in pounds}$$
$$= 16666 \times .628 \times 1.25 \times .1035$$
$$= 1355 \text{ lbs.,}$$

in which the face "F" is taken as double the circular pitch, which is good practice in motor car work.

Knowing the pull in pounds, we may determine the horsepower as follows:

$$H.\,P. = \frac{2\,\pi\,R\,S\,W.}{33000}$$

in which R is the pitch line radius of the gear in feet; S the angular velocity of the gear in revolutions per minute; W the pull in pounds. Hence for the pinion in question:

$$H.\,P. = \frac{6.28 \times 0.15 \times 1000 \times 1355}{33000} = 38.6 \text{ H. P.}$$

If, however, it is desired to know the pull W, instead of the horsepower ability of a given gear, the following method will suffice:

$$P. = \frac{H.\,P. \times 33000}{2\,\pi\,S} = \text{Torque-pull in pounds at one foot radius,}$$

and:

$$\frac{P}{R} = W.$$

Hence for a motor of, say, 38.6 horsepower (actual) rating, the value of W of an 18-tooth 5-pitch, 1¼-inch face pinion would be adequate, because for this motor

$$P. = \frac{38.6 \times 33000}{6.28 \times 100} = 202. \text{ T.-pull in pounds at one foot radius,}$$

and:

$$\frac{P}{R} = \frac{202.8}{0.15} = 1355.$$

$= W$ of the required pinion, which corresponds to the ability of the 18-tooth pinion previously considered. The value 0.15 is the pitch line radius in feet of that pinion.

As a general rule, the first speed pinion is likely to be overworked, if anything, because of its low diameter, whereas, on the other hand, the remaining gears are usually large enough in diameter to limit the pull upon them to a safe point. The practice of making the pinion and its meshing gear of a coarser pitch and wider face than the rest of the gears is with a view to overcoming this trouble.

NOTE.—This article was received at our office before the publication of our recent *article on change gear design.—Ed.*

Shop Testing of Motors.

The subject of motor testing has repeatedly come up for discussion in these pages, but always with reference to some particular method. It is the purpose of this article to deal with the subject in a more general way, in order to show the requirements and limitations of such work, and to briefly outline the various methods in most common use.

The specific objects of commercial motor testing are to determine whether the moving parts are properly seated in their bearings; to find the conditions under which the best results are to be expected, the range through which successful operation may be obtained, and the power which the machine is capable of developing. To do this, the useful work is transmitted to some form of mechanism by which it is absorbed, and which furnishes at the same time means of calculating its value. Such an apparatus is called an absorption dynamometer. Its different forms will be taken up in detail presently.

In commercial motor testing—by which is meant a manufacturer's tests of a series of duplicate engines—the process may either be carried out independently in each case, or one particular motor may be used as a standard, and the others merely compared to that. In other words, if one engine has been accurately tested in every detail, and the results have been reduced to proper units, so that an absolute rating is obtained, other engines which are precisely similar to it in every respect, may be tested with sufficient accuracy for this purpose by a comparison of data step by step, with that of the primary test.

The horse-power furnishes an absolutely general, albeit much abused method of comparing engines of any and all types. But if for a limited group, a single type of engine, an equally satisfactory means of comparison be obtained by quicker and less laborious methods, the horse-power as a unit may be neglected for the time being.

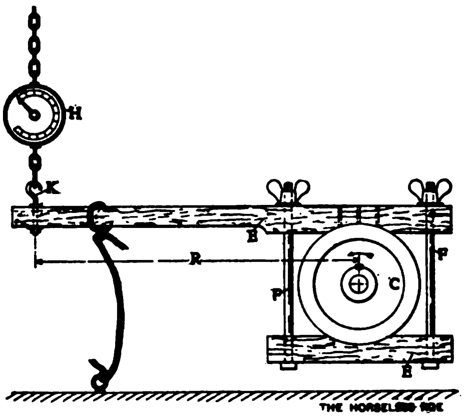
A new engine, before it is ready to undergo a power test, must pass through a process to get the moving parts into proper working condition. This process may last from a couple of days to a week or more, according to the degree of closeness with which it has been fitted. It is first connected to be run by a belt. In this way the bearings may become seated without the danger of overheating, which would exist if its own power were used at first. After a suitable length of time, connections are made, and the motor is turned by its own effort. After several hours of running in this way, some sort of load is applied to steady its action. This may be either some form of friction brake, a screw-propeller revolving in a tank of water, or the power may be made use of in "running in" other "green" engines. When it has at length begun to run with considerable freedom, and to act normally, the real test is applied. If, then, it fails to come up to the required standard, the load is again put on, and it is run several hours longer in this way, under the assumption that the unsatisfactory result is due to friction.

In the test itself, three things are to be accomplished—the setting of the carburetor and timing of the ignition for maximum power and speed; the adjustment of the dynamometer to impose a steady load, increasing by uniform increments, and the observation of the factors of speed and load from which definite results are to be calculated.

The matter of carburetor adjustment must vary somewhat with the form used. But with any type having a throttle which does not alter the proportions of the gas, it is well to run the engine under a medium load at about half throttle with the spark set to keep the speed about normal, and to then adjust the gas and air for maximum speed. If the carburetor does not control the mixture uniformly, the adjustment must be made with the throttle wide open, the spark set partly back, and a partial load placed on the engine to prevent its racing.

In adjusting the dynamometer for the different loads, it is essential to allow a proper interval after each change has been made, to permit conditions to become settled, for the great amount of energy stored in the flywheel of a gas engine makes it capable of carrying considerable overload for a few seconds. Because of this and certain other considerations dependent of the type of dynamometer used, at least half a minute, and preferably a much longer interval, should be allowed to pass before taking any readings.

Tabulated blanks should be prepared before each test, and the data entered according to some fixed system, so that no error can arise from a misunderstanding of results. Results should always be checked up in a general way as fast as they are obtained, by comparison with the primary test, referred to above, or with the average of values already taken from other tests. Unusual results may come from one of three principal causes. These are, error in observation, error in the instruments, and fault of some sort in the engine. Weather conditions also affect the results to a certain extent. To correct for errors in reading the instruments, at least three sets of observations should be taken where any degree of accuracy is desired. By frequent calibration of the instruments and the use of corrections for readings obtained from them, error from the second cause may be avoided. If the questionable data be traced to the engine itself, it will usually be found to extend over several observations and will show a tendency one way or another, which may be traced to



SKETCH OF PRONG BRAKE.

improper adjustment somewhere, as to the engine being yet a little stiff.

Absorption dynamometers may be divided into two classes. those employing mechanical means, and those which make use of electricity for using and measuring the power. The most common and simplest of the mechanical forms is known as the Prony brake. This dynamometer depends on the friction of a brake upon a wheel and the measurement of the effort necessary to keep it from revolving with the wheel. A good form is shown in Fig. 1. The brake consists of two pieces of oak scantling, E E, shaped to fit over the rim of the brake-wheel, C, which is either put on in place of the flywheel or clamped to it directly. The blocks are held in place by two long bolts, F F, which extend between them on either side of the wheel. The tension of the brake is regulated by wing nuts working on these bolts. The load is carried by an ordinary spring scale H. Three or four holes three-sixteenths of an inch in diameter are drilled in the beam to permit of oiling the pulley from time to time. A rope should be fastened loosely to the bar and passed to a ring in the floor, so that the brake will not fly back should the engine "kick." Provision for cooling the brake is made by casting the rim of the wheel in the form of a trough, so that it may be kept partly filled with water while running. Circulation of the cooling water is effected by piping.

Before any readings are taken, the scale is balanced with the engine at a standstill. This gives the unbalanced weight of the apparatus, and is a correction which should be deducted from all subsequent values obtained. The horse-power absorbed by the brake is obtained from the formula:

$$(1)\qquad \text{H. P.} = \frac{2\pi r N W}{33{,}000}$$

Where r = length of beam from center of wheel to point of support on scale, in feet.
N = number of revolutions per minute.
W = corrected scale reading in pounds.

The rope brake used in some factories, is a variation of the form just described. It strands of hemp rope, wrapped around the brake-wheel, and kept in position by the flanged blocks. One end of the rope is suspended from above by a spring balance, and a variable weight is hung from the other.

The horse-power formula is similar to that just given, except that the load, W, is obtained by deducting the average pull on the spring balance, from the total suspended weight. Then,

$$(2)\qquad \text{H. P.} = \frac{2\pi r N (W^1 - w)}{33{,}000}$$

Where r = radius of the brake-wheel plus the radius of the rope taken in feet.
N = number of revolutions per minute.
W^1 = suspended weight in lbs.
w = average balance reading.

For a more complete description of the rope brake, see an account of the Pierce dynamometer in Vol. XIII., page 195, of this paper.

A very necessary precaution to be observed in the use of the Prony brake in any of its several forms, is to maintain as nearly constant conditions of lubrication and temperature as is possible at all times. To this end, plenty of oil should be used on the wheel, and the flow of cooling water should be so regulated as to keep that in the wheel just about at the boiling point.

Another type of dynamometer, simple in application, but dependent on rather more

complex principles, is the fan or blower. An ordinary blower may be used, and the load varied by changing the opening of the inlet and outlet gates. The action of a fan is very stable, and it requires no means of cooling, but it has the disadvantage that the actual values of the load must ordinarily be obtained by calibration, as the accurate calculation of the power absorbed is a rather difficult problem.

A very simple application of the fan principle was described in this paper some time ago (Vol. XII., page 211). It is known as Renard's fan dynamometer. The device consists of a light wooden beam bolted at its center to the end of a horizontal shaft which is mounted on rigid bearings and so arranged that it may be coupled to the crank shaft of the engine. Two aluminum plates of disk form are bolted to the beam at equal distances from the center, to act as fan blades. Holes are bored in the beam at equal intervals to permit of varied adjustments being made. This form recommends itself for its structural and operative simplicity. The only factor to be observed during a test is the speed, as the load is a direct function of the angular velocity of the fan. Hence all values may be obtained from the speed alone, either by calibration or by calculation. Several dynamometers of this type have recently been installed in the laboratory of the Automobile Club of France, one of which is shown herewith.

A still different method of absorbing work is to use a screw-propeller running in a tank of water. This gives satisfactory results in some respects, but is open to the same objection as the blower fan in that it requires calibration.

The electric dynamo furnishes perhaps the most satisfactory method of absorbing the output of an engine and measuring it accurately at the same time. The ordinary way is to drive the dynamo directly by the engine, and to use current generated either for useful work, or to absorb it in some form of variable resistance. For accurate results, the dynamo efficiency must be taken into account. This is obtained either from a calibration curve, or by calculating it from data observed during the test. But, as has already been shown, for purposes of comparison with other tests of a similar nature, the absolute value is not essential, and hence, in ordinary work the efficiency factor may be disregarded. The formula for horse-power obtained in this way is:

$$H.P. = \frac{CE}{746}$$

where C = current in amperes; E = pressure in volts.

The reading may be simplified by using a horse-power-meter, which is merely a watt-meter graduated to read in horse-powers. For the formula for dynamo efficiency and a complete discussion of the subject, see an article in THE HORSELESS AGE, Vol. XIII., page 577.

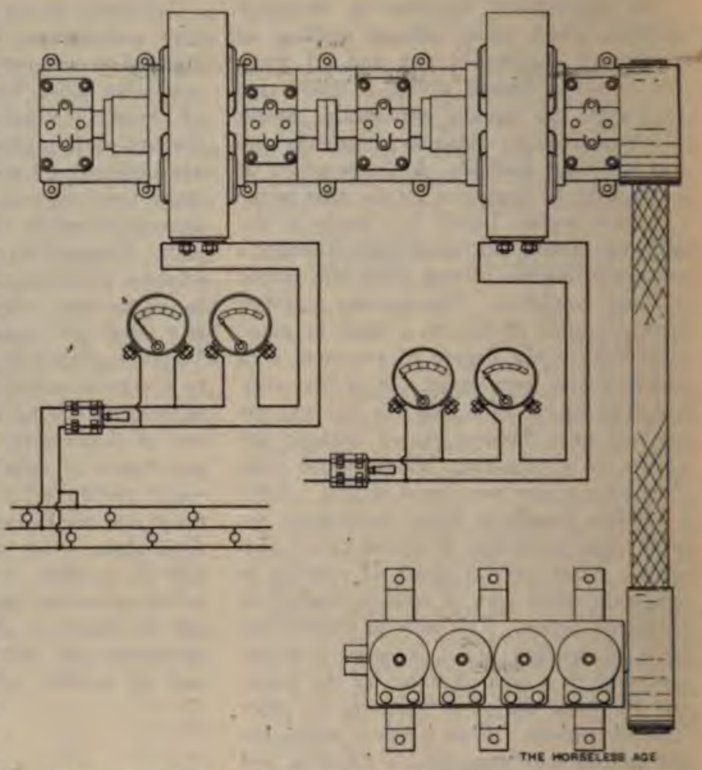


DIAGRAM OF BALL'S METHOD OF GASOLENE MOTOR TESTING.

Another electrical method requiring more apparatus, but entirely satisfactory in that the generator efficiency may be neglected without affecting the result to any extent, was described by F. H. Ball, in a communication published in the issue of July 6, of this year.

He proposes to use a motor-dynamo, or a dynamo driven by a motor, and to load the dynamo by resistance. The motor is so placed that it may, at will, be belted to the gas engine under test. In starting a run, the motor is put in operation, and the dynamo loaded, presumably, nearly to its full capacity. When they have been in operation long enough for conditions to become constant, readings of the load on the generator and the current which the motor is taking from the line are observed. Then the motor is belted to the gas engine and when the plant has been set in motion by the motor, the gas engine is permitted to ignite and take up its share of the load. The instruments showing the consumption of the motor will now give different readings, and the difference of the old and new observations will obviously be the precise measure of the output of the gas engine. Besides the advantage of reading the power directly, this method is advantageous in that the motor has a steadying effect on the engine, and prevents the abrupt variations in speed which characterize the gas engine under test, which makes the reading of data more easy on that account. The drawback to this method is that several sets of pulleys must be provided for connecting the engine and motor, in order to run the engine at different speeds. A diagram showing the arrangement of such an apparatus is given herewith.

RENARD FAN DYNAMOMETER IN TESTING LABORATORY OF THE A. C. OF FRANCE.

In some cases, manufacturers test their motors after they are mounted in the car, either by jacking the machine up and driving some form of dynamometer from one of the driving-wheels, or by placing it on a roller dynamometer and "braking" the rollers.

These methods are really a combination of motor testing and vehicle testing, and while useful for light cars of the runabout order, where a saving of time and labor is of greater importance than accuracy of work, in the case of larger machines, it would hardly be feasible, for the larger engines are so nicely fitted, and require such close watching during the running in, that all parts must be thoroughly accessible at all times, and hence the work is best done on a regular stand.

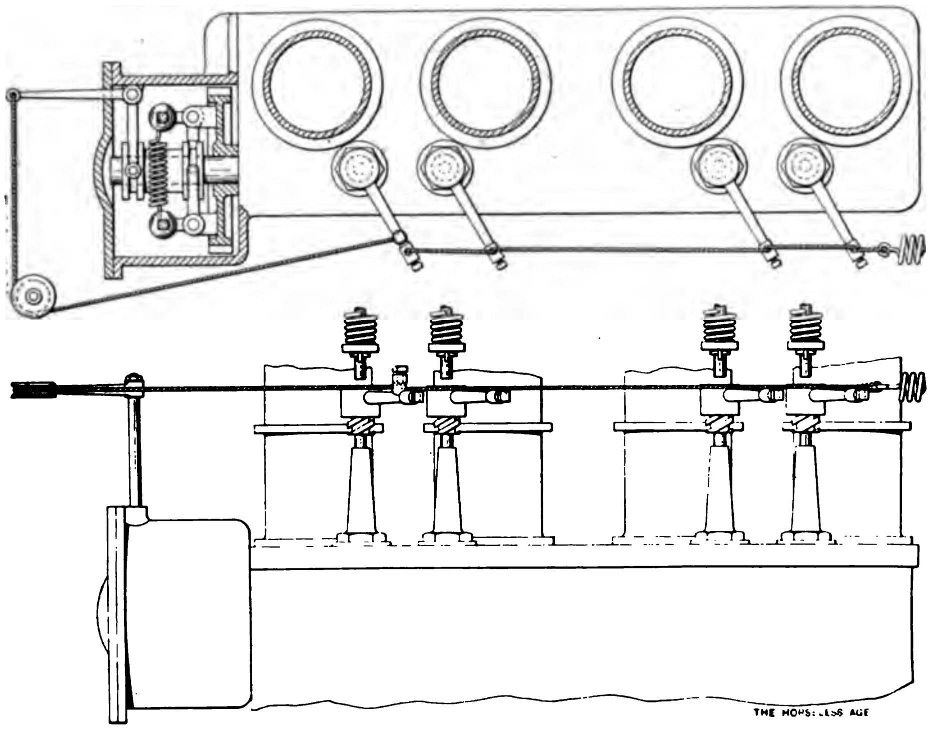
The choice of a method of testing is governed largely by questions of expense and convenience. The tester is usually restricted to the use of such apparatus as is already in stock, and is moreover hampered during the busy season by the constant demand for finished motors to fill orders from the field. That is the time when an inflexible system must be followed.

For the tester's work is a check on the operation of the whole plant, and any let-up in his vigilance may allow the passage of a defective part, whose subsequent failure will do much injury to the manufacturer. The testing department ranks next in importance to the draughting room. The reputation of the firm and the volume of another year's business are vitally affected by its management.

The floor of the garage should be kept free from oil as a precaution against fire and also to save the tires.

The Germain Throttling Governor.

The Germain Automobile Works, which control the Daimler patents in Belgium, have in recent years developed a type of car which differs in many respects from what may be considered standard practice. The cylinders, for instance, are made of steel and worked out of the solid block, and have copper water jackets attached. Perhaps the most interesting feature of their new type of car, known as the Germain-Standard, is the motor governing system which acts by varying the lift of the inlet valves. A plan view and a side elevation of the parts constituting this governing system are shown herewith. It will be noticed that the push rods by which the valves are lifted are provided at the upper ends with enlarged heads which are cut with steep-pitch square threads. These threaded heads take similarly threaded caps which are provided with radial arms. The motor is fitted with mechanically-operated inlet and exhaust valves, which are located on the same side of the cylinder and operated by a common camshaft. This camshaft at its forward end carries a centrifugal governor consisting of two governor weights on pivoted bell cranks, the free arms of which engage with a groove on a sliding sleeve on the camshaft. The two weights are drawn toward the shaft by means of two coiled springs, one on either side of the sliding sleeve. The sliding sleeve is provided with another groove at its forward end with which engages one arm of the bell crank, the shaft of which has bearings in the casing surrounding the governor. One arm of this bell crank extends forward above the governor casing, and at its outer end has secured to it a thin steel wire rope which passes over a pulley and connects to the arm of the threaded cap on the most forward valve rod. It will be noticed that the arms on the different valve rod heads are connected together by means of the same kind of wire rope. The action of the system is as follows: When the speed of the motor increases, the governor weights fly out from the shaft under the action of centrifugal force. This moves the sliding sleeve forward, and through the intermediary of the bell crank and the wire rope, causes the valve rod heads to turn on their threads, and therebv shortens the valve rods, which results in a reduction of the lift of the inlet valves. The engine then only receives a partial charge, and its speed is immediately reduced. When the engine slows down again, the governor weights are drawn toward the camshaft by the two coiled springs uniting them, and the valve rod heads are drawn back into their original position by another coiled spring at the rear end of the engine, specially provided for the purpose.



Germain Throttling Governor System.

Change in British Patent Law.

American inventors who intend taking out patents in Great Britain will be interested in the following act of Parliament, which takes effect January 1, 1905, and which changes certain provisions of the existing patent law:

Where an application for a patent has been made, and a complete specification has been deposited by the applicant, the examiner shall, in addition to the inquiries which he is directed to make by the patents, designs, and trade-marks act of 1883, make investigation for the purpose of ascertaining whether the invention claimed has been wholly or in part claimed or described in any specification (other than a provisional specification not followed by a complete specification) published before the date of the application and deposited pursuant to any application for a patent made in the United Kingdom within fifty years before the date of the application.

If as the result of this official search it appears that the invention sought to be patented has been wholly or in part claimed or described in any such specification the applicant will be informed, and will have the opportunity of amending his specification so as to confine it to so much of his supposed invention as he may desire to patent in view of the specification to which his attention has been called by the comptroller of patents.

The sections of the patents, designs, and trade-marks act which regulate the time for depositing a complete specification shall have effect as if references therein to the period of nine months were references to the period of six months.—Frank W. Mahin, Consul Nottingham, England.

TOURING ROUTES

Motoring In the Tropics.

By A. S. H.

Weeks of intense cold and piercing wind of the winter of 1904 had made us long for a glimpse of summer, so, after some careful consideration, we decided upon a trip to Jamaica, taking with us our steam automobile. Our first care was to provide ourselves with extra parts for the machine and some suitable clothes for the hot weather, and having done this we engaged our passage on the United Fruit Company's steamer "Admiral Dewey," sailing from Boston, February 27th, and found that the cost of carrying our automobile would be only fifteen dollars for the round trip

Saturday morning at ten o'clock we steamed away from Long Wharf while the shivering crowd behind waved hurried farewells and the snow fell fast on the slippery

On the Road to Blue Hole.

decks. Not until we had been two days out at sea did some of us, who had been less fortunate than others, make our first appearance on deck to bask in the warm sunshine, for there was already a great change in the temperature, and we now laid aside our wraps. Soon we commenced to explore our craft, even visiting the hold where we found the cargo to consist solely of a horse, a crate of hens, and our automobile. There were fifty-five passengers on board, and our accommodations were excellent—the staterooms compared favorably with those of an ocean liner, and the table was plain and good. We were impressed with the cleanliness of the ship which was a pleasant surprise after past experience.

Tuesday dawned as fair as the previous day, with of course a noticeable rise in temperature, and the unhappy man who first appeared in a duck suit and tan shoes afforded much mirth, but we all soon followed his example. Unfortunately most of us did not foresee that our winter clothes would more than fill the space that our summer ones had occupied in the trunk, so

Passers-by.

that we were obliged to go ashore with a large part of our wardrobe on our arms. The ocean was wonderfully smooth and the "Dewey" rolled so little now that even the most uncertain sailors regained their spirits and many were impatiently waiting their turn at Shuffle Board. The beauty of this evening surpassed anything that I have ever seen before. The sky was cloudless and the sun in all its glory sank into the summer sea, while the full moon was already up and transforming daylight into the brightest of moonlight nights.

Wednesday, at eight in the morning, we passed Watlings Island, or San Salvador, and at four in the afternoon Cuba appeared above the horizon, but unfortunately the clouds gathered about us and we could see but little until we skirted along the South shore and ran within a mile or two of Cape Maysi. The heavy surf beat against the steep cliffs and the gray terraces rose above one another until they faded into the mountains beyond, while the lighthouse on the beach was the only suggestion of life. By this time it had become rough and many passengers began to look anxious until Captain Israel assured us that it would be smooth as soon as we rounded the point, and of course he was right. At all events we were too much excited over the prospect of reaching land in the morning to think of being sea-sick again. The moon appeared that night in spite of the heavy clouds, from which came occasional bright flashes of lightning, but the effect was so grand and the air so soft and sweet that we were tempted to spend the night on deck.

Blue Hole.

The following morning, Thursday, March 3d, we arose at four that we might see the entrance of the harbor of Port Antonio, and we certainly felt repaid for our trouble, as we came on deck just in time to see one of the most picturesque scenes imaginable. The moon was still high and there was not a breath of wind to ripple the glassy water. On the left, within a stone's throw of our vessel, stood the small lighthouse on the point, sending out its red flashes, and a fishing boat drifted lazily between us and the land, while on the right within an equally short distance rose a small island with palm trees overhanging the water's edge. Before us the high mountains were outlined against the sky and the little town of Port Antonio was just visible in the valley. A steamer from Boston had arrived just before us and we dropped anchor, while waiting for her to land her passengers and pull away from the dock, so we leisurely watched the break of day, but with growing enthusiasm, as one by one the objects on land became more distinct and gained color by the gorgeous sunrise. The roosters on shore, not to speak of the dogs, also hailed the sun with delight, and the sleeping town gradually awoke. At 6:30 we landed and drove hurriedly to the Hotel Titchfield to secure rooms, choosing those in one of the cottages, which are built in the bungalow fashion and have a door and window at each end opening onto a piazza. This being done we returned to the wharf to get our baggage through the custom house and found that our automobile had been unloaded from the steamer, and not having been crated it was ready for use. As we had expected, we were obliged to make a deposit at the custom house of twenty per cent. of the value of the machine, which sum was returned when the automobile was shipped back again. The officers of the United Fruit Company showed us every attention, at once having our tank filled with gasolene and giving us much information about the character of the different roads over which we expected to travel. They also telegraphed instructions to their branch office in Kingston to send gasolene to a place in the interior which we intended to visit, where it could not be obtained.

After breakfast a line of carriages, drawn chiefly by mules, stood waiting in front of the hotel to convey the new arrivals to the points of special interest, but many an enthusiastic sight-seer looked with longing glances at our automobile, and an occasional man went so far as to suggest our making a paying business of carrying passengers.

Our first morning's ride was to Blue Hole, a picturesque spot seven miles from the hotel, and the accompanying illustration will give the reader an idea of the road which wound along the shore.

As the temperature at noon averaged about 90 degrees in the shade, we were glad to return to the hotel for luncheon, which

served in the cool dining-room over-ing the harbor. The middle of the noon we found was the popular time sea bathing, and at the foot of the in front of the hotel piazza, men with boats were always waiting to convey ts to the bath houses, which are built piles in shoal water a mile from the , but just inside the coral reefs. This ngement insures the finest of bathing safety from sharks. The temperature he water is about 85 degrees Fahren- and it is so clear that one can see om at a great depth.

he evening was spent in packing for automobile trip, and we arranged to e all unnecessary baggage at the hotel. were called the next morning at four, to our disappointment found the rain ng in torrents. By ten, however, the had come out and we decided to start. arge extension bag and dress-suit case wrapped in rubber and strapped on back of the automobile, as well as the a shoes for our double-tube tires, while he small seat in front we arranged our erproof robes and raincoats and some isions. We left Port Antonio by a uresque road, following the short to otta Bay, which is a distance of thirty- miles. The streams were swollen by heavy rain, and while most of them had ges, yet a number we were obliged to with the water coming over the hubs our wheels; even the road in places covered by water. Finally we stopped beautiful spot on the high cliffs to eat luncheon, and were entertained by the ves, continually passing back and forth he nearest market with loads of veget- s or fruit poised on their heads.

e had met at the hotel, before starting, entleman from Kingston who owned of the three automobiles on the Island, he was therefore able to give us much rmation about the roads. He warned hat on our way to Kingston we should to a place where the road had been hed away by the hurricane of August, and advised us, before attempting to ver the beach, to hire four or five na- to pull our machine through the sand. n we came to this place, however, not g any people about, we decided to take chances on pushing through alone, and as far as possible into the sand until came to a standstill. We then looked t for help, and found a Coolie near by was willing to push while my husband the throttle wide open and the gauge tered 475 pounds steam pressure. The mpanying illustration will not only the difficulties which we encountered half a mile, but will give the reader an of the amount of baggage which we ed.

think that on our next trip in Jamaica hall dispense with our evening clothes h we had been advised to take.) A hung up inside the hood hides the r from view in this picture, as he

CROSSING THE BEACH.

runs beside the machine. The hour being midday the heat was intense, and we congratulated ourselves many times over the fact that our automobile had a cover under which we could seek shelter from sun as well as rain.

Just beyond Annotta Bay we turned into the pass which crosses the mountains and is the principal road to Kingston. Here we climbed steadily uphill for nineteen miles and went through the beautiful Castleton Gardens. This road, twisting and turning through the mountains, which are extremely precipitous, is a wonderful piece of engineering. It is so carefully laid out that there is not a grade of over eight per cent. and the road is macadamized all the way. The scenery is wonderful, and the foliage luxuriant even on the highest mountain peaks. Occasionally we came upon one of the picturesque native huts which are thatched with the cocoanut palms woven in and out like basket work. One fact which often impressed us was that in all our journeys about the Island we never found ourselves alone for more than two or three minutes at a time, so incessant is the travel of the natives, old and young, to the nearest town. They frequently walk twenty-five miles each way, carrying heavy loads upon their heads while those more fortunate place their burden in baskets hung upon the backs of their donkeys or mules and plod along beside them.

From the top of the pass we coasted eleven miles down the mountains, emerging upon a wider macadamized road which carried us by Constant Spring Hotel. We ran into Kingston just after dark, and a small boy on a bicycle guided us to the Myrtle Bank Hotel, a large establishment with a courtyard facing on one of the main

DIVING FOR PENNIES.

streets of the city. On the opposite side of the buildings there is a large piazza where one dines, looking out upon a beautiful garden sloping to the water's edge. Our accommodations for the night were very comfortable, the rooms being large and airy and the food well-cooked and served with an abundant supply of native fruits. These we tried in turn, the ever-attentive black waiters telling us what part to eat and our occasional mistakes afforded them much amusement.

On the little pier at the foot of the garden we joined in the common sport of throwing half-pennies to the negro boys who made a practice of diving for them. The person who throws the piece of money tries to mislead the youngsters as to the direction in which he intends to send it, but one of the five or six boys invariably comes up triumphantly and, depositing the coin in his mouth, is ready for another game.

The following morning we were joined by two friends who arrived by train from Port Antonio and, after luncheon at the Myrtle Bank, we all rode in the automobile to Spanish Town, which is the ancient capital of the Island and stands on the banks of the Rio Cobre. The distance

MYRTLE BANK HOTEL.

was about fifteen miles and the road good. We passed the night at the Rio Cobre Hotel, which we found both comfortable and attractive, but our friends decided to start at once for Mandeville, as the next day would be Sunday, and the train would not run. We breakfasted at 5:30 the following morning, and were ready to continue our journey by the time the sun was up. Our road this day led us through Old Harbor, May Pan, Clarendon Park, and then into the mountains again. Another snap shot from our little pocket kodak will, I am sure, give a better idea of the miles of beautiful road which we passed over than my words can describe. While spinning gayly along my husband suddenly brought the automobile to a standstill and remarked that he thought he had heard a slight noise a minute before. We looked back and there some distance from us lay all our baggage in the middle of the road! I tremble now when I think of it, for probably two minutes later it would have been picked up by a passer-by and we would have been robbed of our entire outfit for the journey. From Clarendon Park to Williamsfield, a distance of twelve miles,

Typical of Road from Spanish Town to Mandeville.

we found that we had climbed from an elevation of 187 feet to one of 1,300 feet and seven miles further on at Mandeville we had reached an elevation of 2,131 feet. Owing to the even grades and good roads our speed in reaching this height had actually averaged fifteen miles an hour. We were most delighted on this particular ride with the wonderful orange groves through which we passed for the last fifteen miles before reaching Mandeville. The trees were heavily laden with the fully ripened fruit which lay strewn along the roadside, and we could reach out from our automobile and pick either the blossoms or the oranges hanging from the branches.

We stopped at Williamsfield for two cans of gasolene which had been sent to us from Kingston. We reached the Brook's Hotel at Mandeville in time for luncheon, and our automobile caused some excitement, both among the natives and the guests who flocked from the dining-room to see us unload our baggage. Our two friends were awaiting us, but a heavy tropical shower commenced early in the afternoon and put a stop to the ride which we had expected them to take with us. Time did not hang heavily upon our hands, however, for we passed a delightful afternoon on the piazza where tea was served, and we told one another of our various experiences. According to our usual custom we prepared in the evening for another day's journey. We were told that the distance from Mandeville to Port Antonio was a hundred miles, and in our hearts we resolved to make it in one day, although we fully realized that we might encounter many difficulties on these wild roads in a strange country. Our reasons for making all possible haste were several, the first being that our friends were to return to Kingston by rail that day, and we longed to surprise them by appearing that night when they least expected us. Then, too, this was Monday, and our passage was engaged on the "Admiral Dewey," sailing Wednesday morning early, and we were desirous of having another day to spend at Port Antonio. We breakfasted alone at 5:15 by lamp light, but the sun was well up and it was nearly seven when we left, for we met with numerous delays. The air was filled with the delicious scent of orange blossoms, and once more we were spinning along through the beautiful groves. Our road was leading us continually downhill until we passed through Kendall and Cave Valley, when we began to ascend again. For eight miles we climbed continually until we reached the top of Dry Harbor Mountain, an elevation of 2,000 feet, and looking down into the valley below, we congratulated ourselves once more upon the power of our little automobile which had carried us for more than three days uphill and down, without a delay of any kind. The extra supply of gasolene which we had received at Williamsfield we had as yet no occasion to use, and it remained in two large sealed cans, packed in a wooden box, which we had placed in the front of the automobile below the seat. Our baggage was so heavy that in going over rough places the rear springs occasionally touched, and I felt somewhat anxious as to whether the great good luck we had had so far could continue throughout our journey.

Perhaps my husband had similar thoughts as he pressed hard on the foot brake and occasionally reversed the engine as we ran down the steep winding road toward

Arrival at Mandeville.

Brownstown, but at all events we both saw too late a big "thank-you-marm" only a few feet before us, and my warning cry of "Look out!" was unnecessary. The jounce was so great that the box of gasolene bounded from its resting place into the road before us and our machine passed over it with a crash which echoed through the mountains. With wonderful rapidity my husband brought the automobile to a standstill, but not before I had visions of a terrible fire and a very sad ending to our trip, while he calmly remarked "We are smashed up at last!" I sprang out just in time to look back upon a road, strewn with bits of kindling wood, and a waterfall of gasolene, which had cost us fifty cents a gallon, pouring down upon us! This was too hard to bear! I seized one of the dilapidated cans in the hope of saving some, but gasolene spurted from crevices on every side, so I abandoned it to care for the other. I glanced at my husband to see why he did not assist me, but apparently it mattered little to him what became of the gasolene so absorbed was he in viewing his engine which, being in a horizontal position beneath the carriage, had felt the full force of the blow on the packing box. At this moment our attention was turned to the natives, both old and young, who having seen us pass their huts but a few minutes before and hearing the noise, rushed to our assistance surprised to find us both unhurt.

On further investigation we found to our astonishment that the engine was practically uninjured, the case only being badly dented and the automobile had suffered no other injuries except breaking the truss of the forward axle. After an hour's work in repairs we again resumed our journey with thankful hearts, for had we been disabled at this point it would have been necessary to have the automobile towed by mules or oxen fifty miles to the nearest railroad station. As it was we rode into Brownstown triumphantly and were guided to the market-place to obtain water.

Our kodak picture shows a man standing on top of the market tank ready to fill the pail as fast as our steam siphon empties it, and the curious crowd surrounding the automobile, while I seek shelter from the midday sun.

After reaching Runaway Bay our road continued to wind along the shore to St. Ann's Bay and Ocho Rios, where we came upon a stream over a hundred yards wide, which rather appalled us. We stopped short to contemplate the problem of fording it, and then recalled with much satisfaction the fact that before starting, having anticipated difficulties of this kind, we had provided ourselves with a rope and tackle which would enable us to pull the automobile out of any river or mud hole. It did not become necessary, however, to use it, for at this moment a man appeared on horseback and guided us through the shallowest part of the river, but it was not without many fears that we watched the hubs of our wheels sink under water. We reached the opposite side in safety, however, and were much pleased to find our fire still burning.

This day proved to be one full of excitements and narrow escapes. We had gone but a mile or two further on when we met a young woman driving with her two little children and a nurse. The horses took fright at our automobile, rearing and plung-

A Picturesque Watering Place.

Through Banana Plantations.

ing until the carriage barely escaped being upturned, and the young mother in her fright threw down the reins and covering her face with her hands burst into tears. We both sprang to their assistance and as the horses started to climb a bank my husband caught them while I helped the children to a place of safety, and returning to the automobile ran it well out of sight of the terrified animals, while they were still being held in their comparatively helpless position. The woman soon became calm and showered us with words of gratitude as we started all safely off again.

I have not enumerated many other adventures which we had in meeting mule teams or donkeys on the narrow mountain roads, and will not attempt now to tell of two other very narrow escapes which we had on this same day, but it is enough to say that throughout our trip we caused no accident, except to a hen who caught her head between one of our front wheels and the mud guard, but was eventually rescued alive and apparently unhurt.

Obtaining water for the automobile throughout our trip was often an interesting problem and afforded us many a picturesque scene. When in the interior we found it best to make our want known to some of the native women, who are always to be found wandering along the roadside and are thankful to earn a few pennies. Several girls would hurry to the nearest spring and, filling five-gallon tin cans, would return carrying them on their heads. To save time we would place the steam siphon in one of the cans while the contents of the others were used to replenish it. In other places our best opportunity would perhaps be in crossing a high bridge where we would call to some of the women who were washing their clothes in the river below, and they would glady assist us. In all parts of the Island we found the natives most obliging, and they were grateful for a small fee in return for their services. A convenient mode of obtaining water is to be seen in the accompanying photograph, which was taken in a mischevious moment by my husband when I thought he was busy "oiling up" while I attended to filling the tank. The siphon not being long enough

A Picturesque Watering Place.

to reach the stream, a small boy is occupied in holding up a vessel of water while I stand with one hand on the hose and the other on the steam valve. The boy on the wall *is telling me where to find ripe guavas.*

We passed through sugar and banana plantations, in and out of little towns and amongst thatched huts on the shore, and again found ourselves following the road winding close to the water's edge with the high mountains rising abruptly beside us and often we came across most interesting caves. The air was filled with the perfume of flowers which with ferns of every variety grew by the roadside. As the day wore on we discovered that the distance to Port Antonio was fifty miles further than we had thought for. We had already traveled one hundred miles since breakfast and had not taken time to stop for luncheon, so when we pictured traveling half this distance again before dining and the darkness overtaking us, when perhaps we should be stuck fast in that memorable beach with no help near, our hearts sank.

The sun was already low as we rode into the little town of Port Maria, and thus abandoning our original plan inquired for the best lodging house. We were shown to Mrs. McIntire's, a "hotel," consisting of three rooms, where we gladly took refuge for the night, as a heavy thunder storm was already gathering. Our ac-

A Native Hut.

commodations were very primitive, although we were provided with a huge bath tub, built of concrete, which was located in a shed next door. We dined with the two other guests of the house, who proved to be gentlemen from Kingston, and who kindly entertained us with interesting tales of the Island. We were served with native dishes and waited upon by a little negro girl of ten, clad in the usual fashion and with bare feet and arms. We should have slept well that night after the fatigue of the day had not my curiosity been much aroused in the middle of the night by a repeated low pounding, mingled with hoarse whispers, which seemed to come from the next room. We arose and looked about, but on discovering nothing, my husband decided to dismiss the matter from his mind and go to sleep again, declaring that the darkies were either chopping wood or playing "Slap Jacks!" At breakfast the next morning on being asked by our Kingston friends how we had slept, I told my weird tale, which was received with much amusement, and I was informed that we were residing next to the bake shop, and the noise which I had heard was the kneading of bread.

At 7:30 we were ready to resume our journey to Port Antonio, but on leaving the door discovered that a piece of brass tubing connecting the automatic oil pump with the engine cylinder had broken, so out came our soldering kit, and while we worked such a crowd of curious blacks surrounded us that we had hardly room to turn. Our tires were badly worn and we took this opportunity to repair them also, covering the outer shoes in several places with large strips of heavy canvas. It was well we did so, for we soon came to a road which was being repaired, and struggling on over many rough places and pulling through mud up to the hubs of our wheels, we came out upon a stretch of broken stone over which we passed for a distance of five or six miles. As a result our four tires looked as if they had been chewed by rats, and the fifth, which we had discarded the day before, seemed like new in comparison. Patch after patch we were obliged to put on, but all this time the inner tubes had fortunately remained unpunctured.

Jamaican roads are an interesting piece of the native woman's work, for she it is who does the hardest labor. Climbing the mountain side, carrying a large stone upon her head, she may be seen on her way to the roadside, where, depositing her burden, she sits astride upon a pile of already broken stone, and lighting her pipe continues the arduous task of breaking the rock with a small hammer.

At noon she stops to build close by a tiny fire of twigs upon which she sets her iron kettle and cooks her dinner. Old and young women continue this task for their living, sometimes alone, and again in groups working together. The government pays a small amount for each barrel of stone after it is broken and piles by the roadside which have been paid for are marked with tar. At the time of our visit an unusual amount of repairing was being done, as a result of the hurricane of August, 1903, and the roads will probably be in excellent condition by the coming winter.

After passing Annotta Bay we soon found ourselves again upon the beach where the road had been washed away as described in the early part of our adventures, and this time we succeeded in crossing it without any extra help. We planned so that on reaching it our water tank would be nearly empty, in order to lighten the weight, and then putting on full speed we

Hotel at Port Maria.

rushed into the sand until we came to a standstill. Here we waited until the steam pressure rose to five hundred pounds, when we both got out, and I pushed behind while my husband operated the machine. In this way we succeeded in traveling at a pace as fast as we could run for perhaps a hundred yards at a time, when we would again stop to get pressure up and catch our breath. It seemed to be our fate to cross this stretch of sand when the sun was highest, and I never have felt greater heat than that which I experienced on this day while pushing the automobile at the same time running through the deep gravel and having a cloud of sand mixed with steam pouring into my face. We were told that only two other automobiles had ever tried to cross this place, and that the first was pushed through by the assistance of four men while the second, being a heavier car, had to have boards laid in front of the wheels and be drawn by a pair of horses. A road was being built further inland to avoid going over this beach, and is probably open by this time.

We continued to follow the coast as before, and passing Buff Bay, Hope Bay and St. Margaret's Bay we finally reached Port Antonio at 2 P.M., where we once more joined our friends who had been anxiously watching for us all the morning.

Our automobile was greeted as a hero, having traveled about four hundred miles over good roads and bad, struggling through sand, mud and broken stone, fording streams and climbing mountains, yet ever bearing its heavy burden triumphantly through all. After luncheon we were ready for another ride, and we took our friends for a spin to Golden Vale and back.

That night we repacked our trunks for the journey home, expecting to sail at ten the next morning. On going in to breakfast, however, we were greeted by the welcome news that the "Dewey" had not returned from her trip to Costa Rica, and so probably would not start for Boston until the following day. We were delighted to have this extra time to spend at Port Antonio, and made the most of every moment, bathing, sailing and driving. Our only regret on leaving was that we had not found time to take some delightful horseback rides and also to go fishing, for this, I am told, is one of the greatest sports to be had in Jamaica.

At nine Thursday night, March 10th, we were all, the automobile included, safely aboard the "Admiral Dewey," once more, and, reluctantly bidding Jamaica good-bye, we steamed out of the little harbor at midnight. We were almost as fortunate in having a comparatively smooth voyage home as we had been in coming, and on Wednesday, March 16th, just eighteen days from the time we started, we landed in Boston during the early morning. The weather was the same as on the day we left, a cold wind blowing and the air filled with snow.

New Vehicles and Parts

The Autocar Four-Cylinder Touring Car.

The Autocar Company, of Ardmore, Pa., are getting out for the 1905 season a new four-cylinder, side entrance tonneau model. The car is of distinctive appearance, owing, chiefly, to its exceptionally low construction, and possesses a number of refinements in mechanical design over former Autocar types, although it retains most of their exclusive features. The first model of this type was completed late in August, and has since been subjected to severe and prolonged road tests; a second model with minor improvements is now nearing completion, and the first lot of cars of this type will be finished in January next. The first model has never been put into a "finished" condition, and a number of exteriorly mounted parts, such as spark coil, circuit breaker, radiator, etc., will be changed on the new model, for which reason we are not able to show a correct outside view of the car complete at this time; however, the engine, change speed gear, rear axle construction and frame will all be the same as in the completed model, and what few changes in details are to be made, have been fully decided upon, so a correct description of the final machine can now be given. It may here be stated that the car will weigh about 1,900 pounds in touring condition and is rated at 16 to 20 H. P.

THE ENGINE.

The engine is a four-cylinder upright of 3½ inches bore and 4 inches stroke. It has mechanical inlet and exhaust valves, which are arranged in valve chambers on opposite sides of the cylinders. Both sets of valves are identical and interchangeable. The cylinders are cast in pairs, with heads and valve chambers integral. The heads of the cylinders are closed by threaded brass plugs, and the heads of the water jackets of each pair of cylinders by means of brass plates clamped in place by means of stud bolts screwing into the brass plugs. The joint between the jacket wall and the brass plates is made water-tight by means of a paper gasket. The two pairs of cylinders are bolted down to an aluminum crank case in two halves with a horizontal joint through the center of the crankshaft. The upper half of the case is cast with four integral supporting arms, by means of which the engine is carried on the engine cradle. All crank bearings are entirely supported by the upper half of the case, so that the lower half can be removed without disturbing the crank, connecting rods and pistons. The crankshaft is a drop forging, and has three main bearings—one at either end ond one in the middle of the crank case. The connecting rods are also steel drop forgings with brass bushings at either end. The only crank ends are adjustable. The pistons are made with separate heads, to avoid the necessity of unduly extending or springing the packing rings to force them into their grooves, which is thought to deform rings which have been ground to a perfect circle. The pistons have three rings, viz., a narrow one below the piston pin and two broad ones (⅜ inch) above the piston pin; these latter are slipped into place without extending them, and are separated by a narrow uncut ring or spacer. After the rings are put in place the head of the piston is screwed into place, and is then locked securely by means of a rivet passing through both parts. The piston pin or wrist pin is held securely in a central position by means of a novel spring locking device, which is used in a number of places on the car and will be described in detail further on. It is the invention of one of the company's toolmakers. All the reciprocating parts are made as light as possible, to avoid all unnecessary vibration. The same applies to the structural part of the engine.

Each set of valves is operated by means of a separate cam shaft, the two shafts being enclosed within the engine crank casing and driven by means of spur gears enclosed in separate aluminum casings at the forward end of the engine. The cam gear pinion on the crankshaft drives the gears on the two cam shafts through an intermediate pinion. The two cam shaft gears are bolted to hub flanges secured to the cam shafts, the bolts passing through oblong slots in the web of the gears, which allows of adjusting the gears slightly for wear of the teeth. The cams are, of course, hardened, as are the cam rollers at the lower end of the valve rods, and their pins.

The explosive mixture is furnished by a new design of carburetor with float feed, nozzle spray and supplementary air admission. The carburetor is located low down at the inlet side of the engine, and connects to the different inlet valves by means of a cast brass manifold, drawn brass tubes and union glands. In the manifold casting is formed a vaporizing chamber consisting of an enlargement of the pipe in which are arranged several layers of wire gauze. The mixture of air and gasoline vapor formed in the carburetor is drawn through these layers of gauze and is claimed to be rendered more homogeneous thereby. The cast brass manifold and brass tubes of the inlet system are polished. A butterfly valve located in the inlet tube serves to throttle the engine, and is controlled from the steering wheel, the same as the spark timer, as will be described in detail further on. The gasoline tank, with a capacity of 15 gallons, is located under the front seat. It has two compartments, one of which is of 12 gallons capacity, and the other of three. The pipe to the carburetor leads from the 12-gallon compartment, and the small compartment ordinarily remains filled; but if the supply in the main compartment should unexpectedly run out on the road, the two compartments can be thrown into communication by opening a valve, and the reserve

supply of three gallons thus be made available. The feed of the gasoline from the tank to the carburetor is, of course, by gravity.

IGNITION.

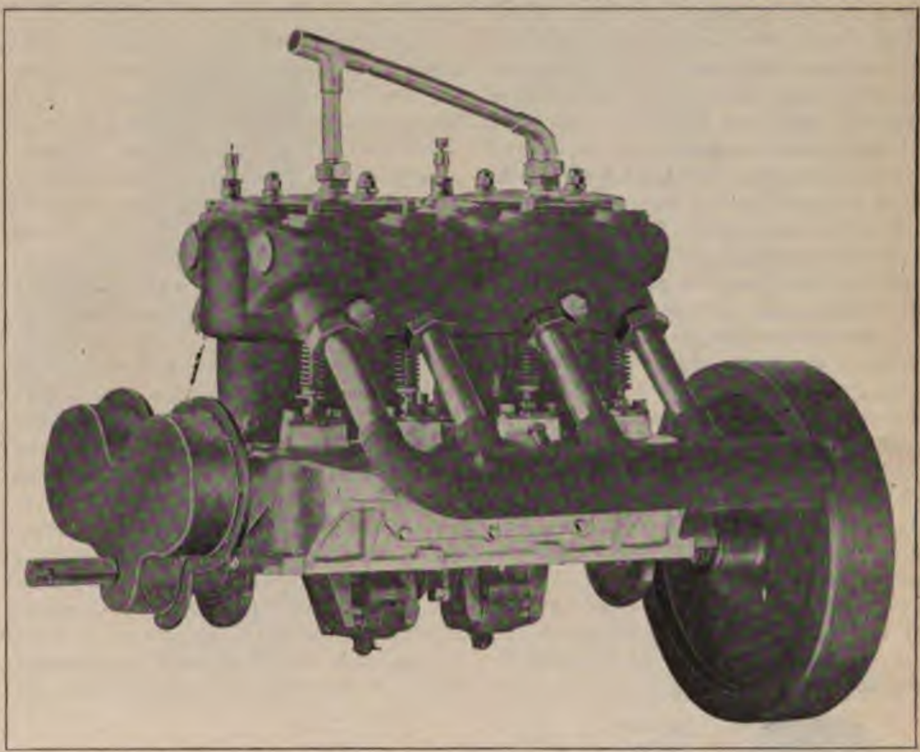
Ignition is by jump spark, the spark plugs being screwed into the plugs over the inlet valves. The necessary current is supplied by two batteries of dry cells carried in the rear seat. A quadruple spark coil is located on the dashboard and is provided with a switch which, in its three different positions, connects the coil to one battery alone, the other battery alone or the two batteries in parallel, respectively. The contact breaker, or commutator, is of the internal roller type and is located back of the dash in direct view of the operator, in a nearly upright position. Its shaft is driven from the inlet valve cam shaft by means of enclosed bevel gears.

An interesting system of lubrication is used for the motor. All parts of the latter are lubricated by splash in the crank case, and the oil is constantly circulated through the crank case and an oil supply tank by means of a positively driven gear pump. The supply tank is made of aluminum and is secured to the bottom of the crank case. Two overflow pipes extend up into the crank case to the height at which it is desired to carry the oil level. The oil pump is located at the rear of the crank case, in the direct line of the commutator shaft, and is driven by the same pair of bevel gears, which are provided with ball thrust bearings. The pump takes its supply from the oil supply tank and continually delivers oil into the crank case at a point where it splashes over the working parts most effectively. The surplus oil constantly returns from the crank case to the supply tank at the bottom thereof through the overflow pipes. The crank case is formed with a partition wall at the center, to prevent all the oil running to one end of the case when ascending or descending a steep hill. The pipe connection from the pump to the crank case passes through a circulation tell-tale on the dashboard, giving the operator a constant indication of the manner in which the circulating system performs its function.

The exhaust gases are led from the exhaust valve chambers through short steel tubes, a malleable iron manifold and another large steel tube to an "ejector" muffler located in front of the rear axle at the right-hand side.

COOLING SYSTEM.

The cooling system comprises a combined tank and radiator forming the forward wall of the bonnet, and a centrifugal circulating pump, resting on the engine cradle and gear driven from the rear end of the exhaust cam shaft. The radiator is of the flanged tube type, the tubes being arranged horizontally. A fan is arranged back of the radiator, being mounted on a hollow, stationary stud secured to the top of a brass fan bracket, which in turn is fastened to the engine cradle. The hollow stud on which the fan revolves is filled with grease and provides sufficient lubrication for a long period of use. The fan is driven by belt from the front end of the crank shaft, at a considerable increase in rotative speed. The pump takes the water from the bottom of the radiator and forces it into the jackets at the lower end thereof, while from the top of the jackets the water returns to the top of the radiator. The connection to the top of the jackets is made by means of a copper manifold connecting to the brass plates on top of the jackets, and a short length of rubber hose is interposed between this brass manifold and the tank on top of the radiator.



AUTOCAR FOUR-CYLINDER ENGINE, EXHAUST VALVE SIDE.

The starting crank for the motor remains permanently in place, and is held in a leather sleeve or cover suspended on a coiled spring from one of the front spring horns—to keep the handle free from mud and to prevent its swinging when not in use.

The engine is provided with a 14½-inch flywheel, which is keyed to a tapered portion of the crank shaft, and secured in place by a lock nut in the usual manner.

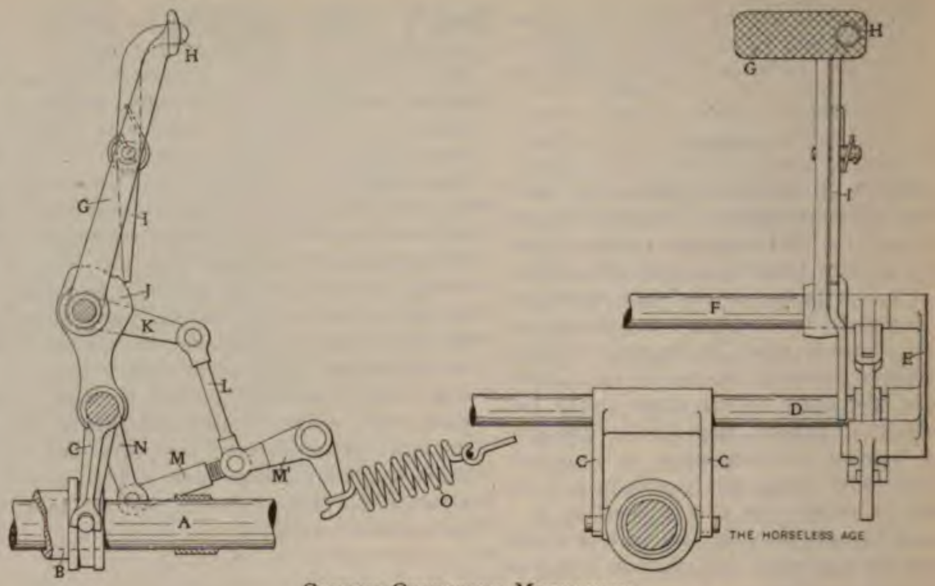
The clutch is of the disk or end-on type and is located inside the rim of the flywheel. The flywheel rim is drilled through radially at four equidistant points, to receive bolts with rectangular heads at the inner ends and slightly riveted over at the outer ends. The heads of these bolts form feather keys for a bronze ring of a little smaller diameter than the inside of the flywheel rim. On each side of this bronze ring is located a pressed steel ring of channel section, the forward ring being carried by a spider on the driven shaft, while the other ring is simply a floating piece. The two pressed steel disks can be clamped down on the bronze ring between them, by means of a set of three bell cranks and toggle links, and a sliding collar, as shown in the cut herewith. The bronze ring is provided with a number of cork inserts, to increase the friction. The bell cranks are pivoted on lugs extending backward from the spider carrying the forward pressed steel ring. The outwardly extending arm of the bell crank is provided with a setscrew which presses against the floating pressed steel ring, when the sliding collar is shifted to bring the toggle links into a position approximately at right angles to the driven shaft. A number of radial flat springs on the spider on the driven shaft hold the three friction rings out of contact when the clutch is disengaged. The clutch is adjusted by means of the setscrews, which, when the adjustment has been made, are secured by lock nuts. This clutch is said to have proven very effective in every respect—gripping gradually and then holding securely.

The clutch is operated by a pedal lever in the usual manner, but the clutch control mechanism is quite original. Referring to the sketch herewith, A is the clutch shaft on which slides the clutch sleeve B. The groove at the rear end of this sleeve contains a ring with radial pins on opposite sides which are engaged by the forked ends

of the double shifting lever C. The lever C is secured upon a shaft D which extends entirely across the frame of the car and is supported at its opposite ends in bearings in brass brackets secured to the frame side rails. One of these brackets, E, is shown in the drawing. A second shaft, F, extends parallel with shaft D across the frame, and is mounted in bearings in the same brass spiders; it carries the clutch pedal G and also the brake pedal (not shown.) A feature that is not found in any other car is that the clutch pedal can be locked in the "out" position, so that it is unnecessary to keep the foot constantly on the pedal when coasting a long hill; also, when the car is stopped with the gear in the second speed position, for instance, it is not necessary to bring the gear to the neutral position, as the car can be stopped by simply throwing out the clutch and locking it, and the car can be started on the second gear, by simply releasing the clutch lock.

The clutch pedal is of more than the usual width, and through a drill hole on the right-hand side extends what is termed a "hold-out" button—a knob H at the end of a pawl lever I pivoted at the middle of the pedal lever arm. The point at the lower end of the pawl lever I moves over a sector J with a single notch. If the driver has his foot on the "hold-out" button when he throws out the clutch, the point of the pawl will entirely clear the sector; but if he holds his foot on that part of the pedal to the left of the button, the pawl will engage in the notch on the sector, and lock the clutch in the "out" position when the foot pressure on the pedal is released.

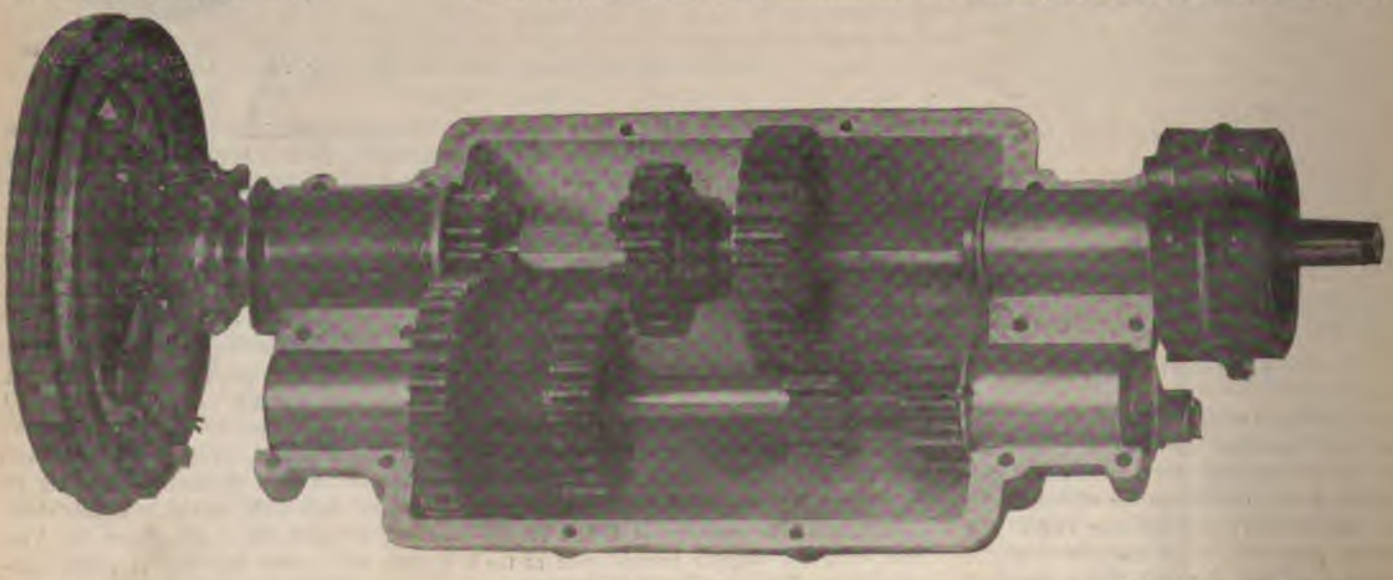
Fastened to the same shaft as the clutch pedal G is a rearwardly extending lever arm K which connects by a link L to a toggle mechanism MM. The toggle link M connects to a lever arm N on the shaft D to which the cluth fork C C is also secured, and the toggle link M[1] is shaped in the form of a bell crank, the clutch spring O being fastened to its free arm.



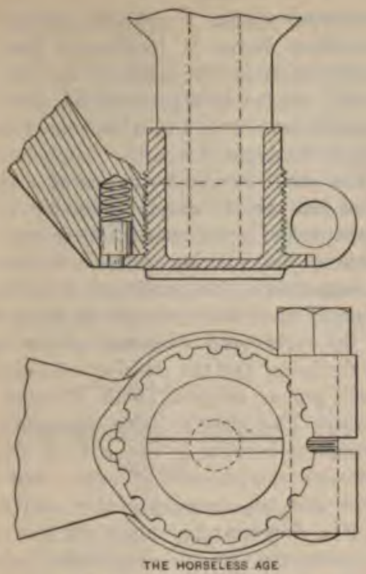
Clutch Operating Mechanism.

The clutch operating mechanism here described has a number of advantages. Owing to the toggle arrangement, a very strong pressure between the clutch surfaces is obtained and at the same time considerable clearance when the clutch is disengaged. The clutch spring does not surround the clutch shaft, and if it should accidentally be broken it can readily be removed and replaced. Finally, the end thrust in the clutch is absolutely self-contained.

The change speed gear is of the sliding pinion type, giving three forward speeds and one reverse, with direct drive on the high gear. The ratio of reduction for the intermediate gear is 1.7; for the low gear, 4, and for the reverse, 5.3. All the bearings in the gear box are Hyatt roller bearings, those on the main shaft being 4 inches long, and those on the countershaft 3½ inches. The countershaft bearings are closed by plates at the outer ends, to make it impossible for oil to work out through them. The bearings on the main shaft are provided with dust-excluding washers. The change speed gears are of steel and hardened, and are cut with six pitch teeth. The ends of the teeth are slightly beveled, this operation being effected mechanically. The gears are all of very liberal width of face for the power they have to transmit. The sliding set of two pinions is controlled by a fork secured to a shifting rod which has bearings in the wall of the gear case. The shifting rod is cut with a number of V notches, one corresponding to each position of the sliding set. Into these V notches engages the V point of a spring-pressed pin which is guided in a short tube secured into the wall of the gear case. It will be easily seen that when the sliding gears are brought into approximately their proper position by means of the gear-shifting lever, the pressure of the spring acting on the V point pin will cause them to automatically move into the exact position, and hold them there. The gear box is made of aluminum, in two halves, being divided in a horizontal plane through the center line



Clutch. Sliding Change Gear. Transmission Brake.



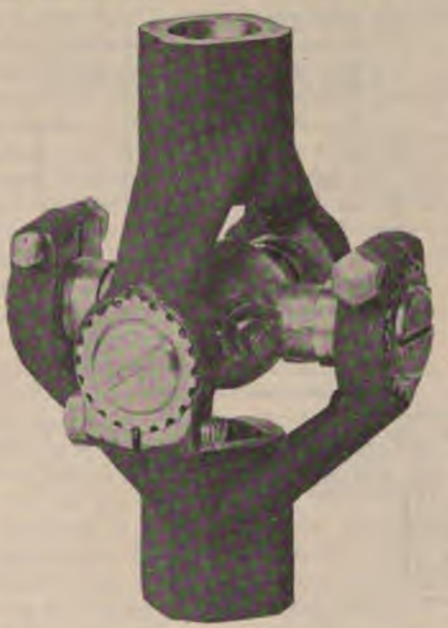
AUTOCAR SPRING LOCK.

of the shafts. The upper half is provided with a large inspection door, and the lower half with a large central oil well, so that all lubricating oil can be readily withdrawn from the box by removing a plug in the bottom of this well.

The transmission to the rear axle is, as already stated, by a propeller shaft and bevel gears. The propeller shaft is of square section over its entire length, and is arranged so as to slide freely in the hub of the forward universal joint. The engine and gear box are arranged at such a level that when the car is fully loaded, the propeller shaft is approximately horizontal, or in line with the engine shaft and the rear axle. The universal joints are of the company's own patented design, and embody one or two improvements over those used on last year's types. Those familiar with "Autocar" construction will remember that the cross of the universal joint is mounted in four bearings in the shape of caps or thimbles—that is, closed at the outer ends—which are screwed into the ends of the yokes forming part of the joint; and the cross is made hollow and filled with grease which is driven into the bearings by centrifugal force, yet prevented from escaping through them because the bearings are closed at the outer end. In the universal joint as now used the cross is made with a spherical grease chamber at the center, to hold a larger supply of lubricant; and the ends of the yokes are split and clamped together over the brass bearings, to prevent the possibility of any shake in the bearings owing to a loose thread. Another improvement is the spring latch pin, which has already been referred to, and which may now be described in detail. Referring to the illustration of one arm of the universal joint yoke herewith, the outer end of the bearing cap or thimble is provided with an external flange into which slots are cut at equal distances. Into the metal of the yoke arm, and in line with the slots in the flange on the bearing cap, is drilled a fairly deep hole of a diameter considerably larger than the width of the slots. Into the bottom of this drill hole is introduced a short coiled spring, and against this spring is pressed a steel pin just fitting the hole, with a reduced outer end just fitting the slot. The spring presses the shoulder on the pin strongly against the flange on the bearing cap, and positively prevents the latter from unscrewing.

The bevel gears on the rear axle give a reduction of 60 to 14. The bevel pinion is provided with the ordinary cup and cone ball bearings, which take up all end thrust on it, and ball end thrust bearings are also mounted on both sides of the differential gear, that back of the driving gear being comparatively large in diameter. The differential gear is of the bevel pinion type. The casing over the driving gear is in three parts, a top part being made readily removable to give access to the gears for inspection, etc.

The main frame consists of heavy wood



UNIVERSAL JOINT.

sills or side rails which are united in front by a downwardly-curved channel iron cross member, and in the rear by a wood cross member. The side rails are reinforced on the inside with pressed steel liners of channel section, which taper away toward both ends. The rear wood crossbar is securely fastened to the side rails by bolted angle plates. The engine and transmission case are supported on a subframe or engine cradle consisting of two pressed steel members supported at both ends on cross members of the main frame. The engine cradle members are also of channel section at the middle portion of their length, but the lower flange and part of the web is cut away at both ends, to produce a supporting member of section substantially proportional to the load at every point. The frame is supported by semi-elliptic springs in front, 34 inches long by 2 inches wide and with four leaves; and by a platform spring in the rear, the side members of which are 35 inches long and two inches wide, and the cross member (at the rear end) 34 inches long and 2 inches wide. Side and cross members both have five leaves each. In the construction of the springs, provisions are made to increase the ability to withstand the strains of rebound, by uniting the outer end of the second leaf to the main leaf by means of a rivet, the rivet head passing through an oblong slot in the second leaf, so as to allow free motion of the leaves lengthwise upon one another, but no separation of the leaves. The springs have their ends secured to malleable iron spring horns and brackets, and the side members of the rear spring are swung outside the frame, by which arrangement three distinct advantages are secured, as follows: (1) The maximum strain on the rear axle is reduced; (2) the stability of the car as a whole is increased; (3) the center of gravity of the car is lowered.

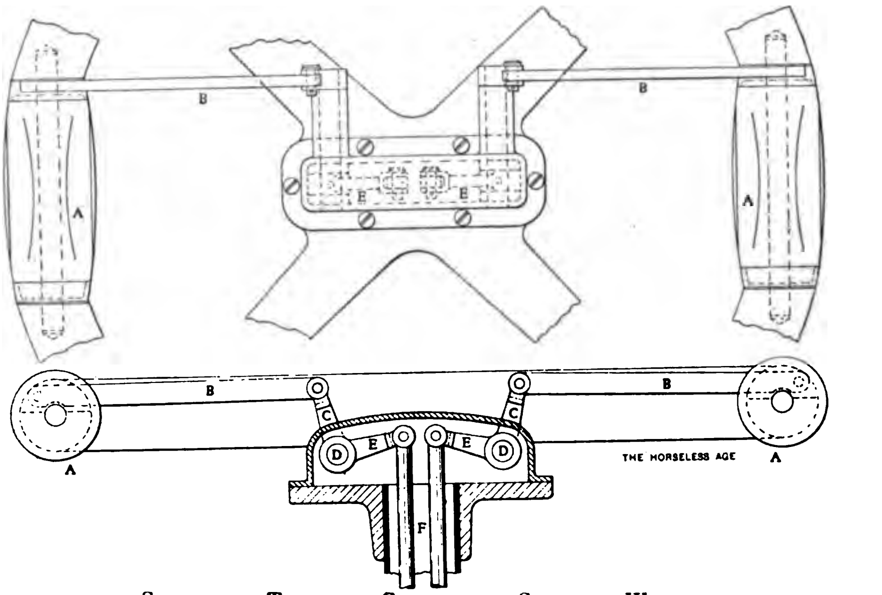
The front axle consists of a 2¼-inch seamless steel tube forming an inverted

REAR AXLE AND DRIVE GEAR CONSTRUCTION.

arch. Over the ends of this tube are slipped the hubs of the steering heads, pinned in place and brazed. The steering heads are drop forgings of the forked type. The two arms of the fork are widely separated, giving a very long bearing for the pivot pin. A small oil cup for lubricating the pivot is located on top of the pin. The steering knuckles are also drop forgings, the axle stub and the vertical head being in one piece. The center line of the axle stub is laid slightly to the rear of the pivot, to produce a self-straightening effect (the steering gear not being back-locking). The arms for the connecting rods are pinned and brazed to the knuckles. The two arms by which the knuckles on opposite sides are joined together extend forwardly, and are connected by a tubular rod with forked joints which are notable for their substantial wearing surfaces. The arm for connection to the steering column is secured to the right-hand knuckle directly underneath the upper arm of the steering head fork, and is so bent as to bring the connecting rod to the lower end of the steering column comparatively high and outside the frame. This connecting rod is also tubular and provided with adjustable ball and socket joints at both ends. In order to adjust the joint at the forward end, it is necessary to first loosen the other joint and then turn the whole rod; while to adjust the rear joint, all that is necessary is to give a slight turn to a screw plug at this end and secure it again by means of a split pin.

The rear axle is a bevel-gear-driven live axle of the usual construction, with outside axle tubes for supporting the weight, and internal shafts for transmitting the driving power to the wheels. The rear axle tubes are of 2⅝ inches outside diameter and of high carbon steel; they are pinned and brazed into ribbed plates of malleable iron which are bolted to the sides of the driving gear case, and at the outer ends have combined spring blocks and brake supports secured to them by pinning and brazing. The structural strength of the rear axle construction is increased by brace rods running from the outer axle fittings to the lower part of the driving gear case. The driving shafts consist of 1⅜ inch cold rolled stock without a shoulder from end to end. The outer ends are squared off to form a driving connection with the wheel hubs. The rear axle is mounted on Hyatt roller bearings—two 3-inch bearings at each outer end of the axle, and similar bearings at each side of the differential gear. The front wheels are also mounted on Hyatt roller bearings, one a 3½-inch cage and one a 2-inch cage. The front axle stubs are drilled out from the outer end, and also radially, so that by simply removing the wheel caps, grease can be introduced to the wheel bearings by means of a grease gun.

The wheels are of the Midgely steep tube type, 30 inches in diameter and fitted with 3½-inch Fisk mechanically attached tires.



Spark and Throttle Control on Steering Wheel.

The car has a wheel base of 96 inches and a tread of 54 inches (center to center of wheels).

The car is fitted with the regular hub brakes which are operated by a pedal, and with an emergency brake on the transmission shaft directly back of the gear box, which is operated by a side lever. The hub brakes are 10 inches in diameter, and are of the double acting steel band type, the bands being lined with leather. The bands are in two halves, each half having one end fixed to a bracket extending downward from the outer end of the axle sleeve, while the free ends can be drawn together by means of a lever arrangement. When not in use, the brake band is held off the drum by means of two short coiled springs, one on either side of a central pedestal. The drum for the emergency brake is much smaller in diameter; otherwise this brake is of similar construction to the hub brakes, except that instead of steel bands, heavy bronze segments are used, and instead of the leather lining, a red fiber lining. The emergency brake is interlocked with the clutch-operating mechanism, so the first motion of the emergency brake lever disengages the clutch and a continued motion applies the brake.

The car is steered by means of a 15-inch wood-rim hand wheel, mounted at the upper end of a 1⅜-inch seamless steel tube forming the steering column. This tube is supported at its lower end in a bearing secured by brackets to the dashboard and to the right-hand side rail of the frame. At the lower end the steering tube carries a bevel pinion meshing with a bevel gear sector. The shaft of this sector extends through a bearing in the wall of the case enclosing the pinion and sector, and at its outer end has securely pinned and brazed to it a downwardly extending arm which is connected to the right-hand steering knuckle by means of a short connecting rod with ball and socket joints, as already explained. The case enclosing the bevel pinion and sector is of brass and in three parts. The shaft of the sector can be adjusted in an axial direction to bring the sector into proper mesh with the pinion. It takes 1½ turns of the steering hand wheel to bring the steering wheels from hard over one way to hard over the other way. It may be noted that contrary to the former practice of the company, all the control devices are mounted on the right hand side of the car.

The spark and throttle control are arranged in the steering wheel and column, in an interesting and novel manner. In the rim of the wheel, at opposite sides, are two hand grips, A A, which are adapted to be turned about metal pins passing through them. The grip or handle on the left-hand side controls the spark timer, and the one on the right the throttle valve. These handles have pivoted eccentrically to their ends, short, flat links B B, the opposite ends of which are pivoted to upwardly extending lever arms C C on shafts D D which have a bearing in the wall of a small casing screwed to the top of the steering wheel spider at the center. Each of the two shafts at the end inside the casing carries another lever arm E, extending radially toward the center of the steering post, its outer forked end being situated in line with the tubular column. From each of these two arms a rod F extends down inside the steering tube. One of the rods extends entirely through the tube and connects by a suitable linkage with the carburetor throttle, while the other is connected at its lower end to a short tube fitting loosely inside the steering tube and connecting by pins passing through lengthwise slots in the wall of the steering tube, to a sleeve on the outside of the steering tube at about the middle of its length. This sleeve is suitably connected to the commutator, located in proximity to it. By turning the handles A A around their pins, the spark and throttle can therefore be controlled by the driver at will

without taking his hands off the steering wheel.

The car is to be fitted with a wood body of the side entrance tonneau type. The front seat is divided, and accommodates two passengers, while the rear seat has room for three. Laminated wood mud guards are fitted over the wheels, and are joined by a continuous step. The equipment consists of a pair of oil lamps, a tail oil lamp, horn, tire outfit, tools and a storm apron. Irons are fitted to the body for attaching a canopy top.

The Mason-Kipp Valveless Oil Pump.

The Mason-Kipp Manufacturing Co., of Madison, Wis., who have been making mechanical lubricators for stationary and traction engines for some years, have lately brought out a type specially designed for use on automobiles. In it, as in their older models, they make use of a valveless pump, the method of operation of which is shown by the part-sectional views herewith.

The block W, shown complete in the view to the right in Fig. 1, is attached to

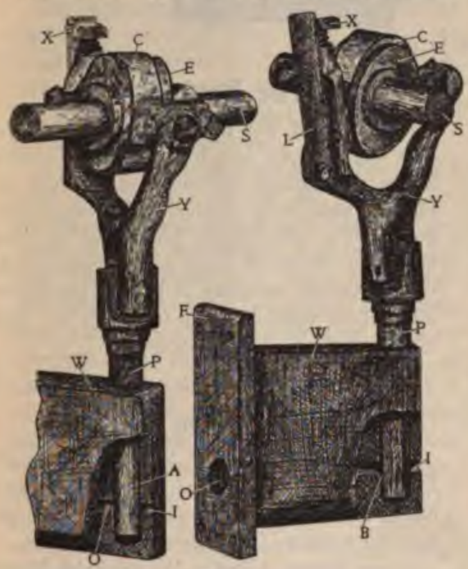


FIG. 1.

the side wall of the oiler by means of the flange plate F, which is screwed to the outer surface of the case (shown in Fig. 3), with the block extending inside the case. A horizontal passage extends through the block from O to I, and a hole of large diameter which passes nearly through the block is drilled vertically at its inner end, and serves as the barrel of a pump into which the plunger P fits. The shaft S runs across the top of the oiler in bearings supported by the case, and carries an angular eccentric directly over each pump. A collar C fits into a groove which runs about this eccentric, and is connected through lugs and screws to the upper ends of a yoke Y, which at its lower end is connected pivotally to the top of the plunger P. As the shaft revolves it gives to the plunger a combined up-and-down and a twisting motion about its longitudinal center line.

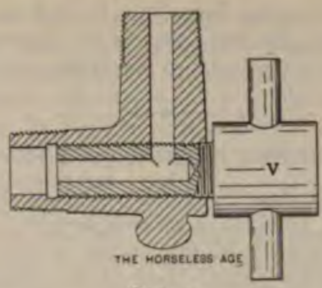


FIG. 2.

Beginning at the lower end of the plunger, and extending upward for a distance, are two grooves, A and B, which run lengthwise of the plunger and are located at something less than 180 degrees apart. A is shown in the view to the left, and B in the one to the right, in Fig. 1. The eccentric E is so shaped that when the plunger moves on the upward stroke, the groove A comes in line with the hole I, and the groove B is covered by the inner wall of the pump barrel. The oil, which entirely surrounds the block W, is then drawn in through the inlet hole I and passes down the groove A into the space beneath the plunger. At the end of the up stroke the plunger is twisted about until the groove B comes in line with the outlet O and the groove A is in turn covered by the walls of the pump barrel. As the plunger moves down, the oil is forced up through the groove B and out of the hole O from which it runs through an attached pipe to one of the bearings.

It can be seen that an oiler with any desired number of feeds can be built up by enclosing a sufficient number of the units herein described within a case which also acts as an oil reservoir.

The shaft S is driven by any positive means—chain, gears or ratchet—from the half-time shaft of the motor. The amount of oil fed to any of the bearings may be varied by means of the square-headed screw X shown in Fig. 1. By turning this one way or the other, one lug on the collar which surrounds the eccentric is raised or lowered, and the stroke of the plunger increased or decreased accordingly. The flat spring L fits against the head of the screw X and locks it in position. Instead of a sight feed attachment, the makers supply the device shown in Fig. 2. This consists of a small plug valve which screws into an elbow through which the oil passes on its way to the bearing. When it is desired to determine the manner in which the lubrication is operating, or to regulate the amount of oil delivered in a given time, this plug V is removed, and the oil will then appear at the plug opening. It is claimed by the makers that as the pump is of generous size and without check valves, its action is sufficiently positive to make a continuous sight feed unnecessary.

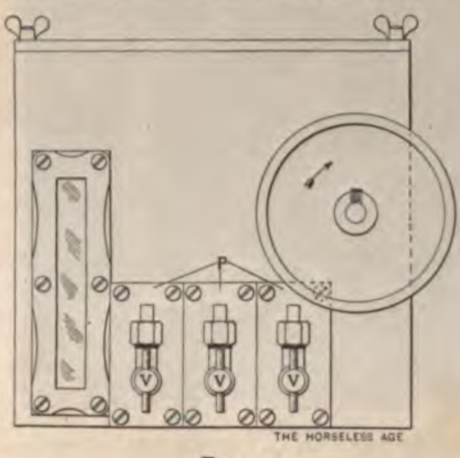
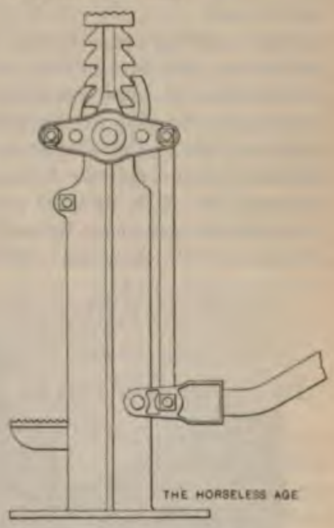


FIG. 3.

Any unit can be cut off altogether while the others are feeding oil, by adjusting the screw X (Fig. 1) so that the plunger P has no upward or downward movement, but merely turns about its longitudinal center line under the action of the eccentric E. The containing case, as has been pointed out, serves also as the reservoir for the oil; and as a glass plate is provided in one wall, the amount of oil in the tank can be seen at any time.



The New Peerless Jack.

The Oliver Manufacturing Co., of 203 South Desplaines Street, Chicago, Ill., are making the lifting jack shown in the accompanying sketch. The ram is fitted with a low bracket which can be used instead of the rest at the top of the ram in case the standard is too high to fit beneath the part to be lifted. To raise the ram, the handle, which in the model shown is hinged at the lower part of the standard and is connected by a metal strap to a walking beam above, is moved up and down in the quadrant below the horizontal position. The two pawls which are pivoted to the walking beam then engage with and pass over the teeth on the racks formed on the ram, in such a manner that the desired result is obtained. To lower the ram the handle is moved in a similar way in the quadrant above the horizontal position. The action of the pawls is thereby reversed. The company also make a smaller jack, in which the physical effort is applied directly to the walking beam by means of a detachable

wooden handle which fits into a socket formed on it. This jack is intended for use with vehicles weighing less than 2,500 pounds, while the one shown may be used for heavier work.

The Veeder Dashboard Odometer.

The cut herewith shows the Veeder Form D dashboard odometer made by the Veeder Manufacturing Co., of Hartford, Conn. As its name implies, it is attached to the dashboard of the car and is driven through a flexible shaft from a pair of gears, one of which is attached to the shaft and the other to a road wheel. It is provided with two registers, one for trip readings the other for recording the total accumulated mileage. Both indicate in tenths of miles, the fractions being shown in red figures at the right. All the gearing of the odometer proper is contained within the number rings in the manner common to the practice of this company, and the numbers are located close together so that they are easily read.

Two styles are offered—the straight drive and the bevel drive, so called. In the former the shaft runs horizontally directly into the side of the odometer, while with the latter the shaft may be brought up straight through the floor of the car or through the dash, and the movement conveyed to the odometer through bevel bears. Ordinarily the device is furnished nickel plated unless some other finish is specified. Special attaching fixtures are provided for each of the standard makes of cars.

Veeder Form D Odometer.

New Side Wire Tire.

The Republic Rubber Co., of Youngstown, Ohio, have recently brought out the side wire solid tire shown in the sketch herewith. The feature of its construction is that at equal intervals about its inner surface, or that which bears against the rim, are a number of flat metal plates, which are imbedded in the rubber and fabric so that their outer surface is flush with the inner surface of the tire, and are so shaped at their upwardly turned ends that space is provided between them and the inner edges of the rim for the side retaining wires. These plates receive the pressure of the side wires, therefore, in much the same way as do the cross wires which are more commonly used in tires of this description. The tire is held to the rim by the edges, which fit under the shoulders formed at the ends of the plates as they are bent away from the rim to make room for the side wires.

Republic Tire.

The advantages claimed for the tire are that the rubber and fabric do not need to be perforated as is the case when cross wires are used, and that an equal distribution of the pressure of the side wires upon the cross members is more readily obtained than with the other construction.

The Reo Car.

The first of the Reo cars, made by the Reo Car Co., of Lansing, Mich., is shown in the photograph accompanying. It is designed along French lines, so called, is propelled by a two-cylinder horizontal opposed motor of 16 H. P., and has a radiator of special design in which it is said the water may freeze without doing injury to it. The cars weigh about 1,400 pounds.

The Reo Car.

Trade Literature Received.

The Hartford Rubber Works Co., Hartford, Conn.—"The Proof of the Pudding," being a pamphlet containing testimonial letters from users of their new Dunlop tires.

Knox Automobile Co., Springfield, Mass. —Illustrated folder and price list of Knox commercial vehicles.

Joseph Dixon Crucible Co., Jersey City, N. J.—"Graphite Lubricants," a booklet setting forth the advantages of graphite lubrication.

Carl E. L. Lipman, Beloit, Wis.—Price list of Lipman rotary circulating pumps.

The Adams Co., Dubuque, Iowa.—Catalogue of the Adams-Farwell cars.

The Chas. H. Moore Oil Co., Logansport, Ind.—Pamphlet containing testimonials from users of and directions for the use of their "Anti-Freezing Lion Cooling Oil."

The G & J Tire Co., Indianapolis, Ind.—Illustrated leaflets setting forth the achievements of their tires in the field of racing.

The Western Motor Co., Logansport, Ind. —Folder, illustrating and describing the Rutenber gasoline motors and accessories.

COMMUNICATIONS

The Tire Bugbear.

Editor HORSELESS AGE:

Your editorial on "The Tire Bugbear," in the HORSELESS AGE of October 19, was eminently fair and I am constrained to give my testimony. I touched on the subject at the close of "Trip to Detroit," in the issue of October 12.

Only four years ago I saw a belt-driven Benz machine, with its high drivers and small front wheels, slowly but surely climbing Durham Hill, England. The solid rubber tires were not a source of mental anguish to the operator. The belt drive has been abandoned for better mechanical devices and their details have been much improved from year to year. Materials have been adapted to the kind of stress to which the part is subjected. Shapes and proportions have been improved until delays from defective design or manufacture of metal parts are extremely rare.

The improvement in wearing qualities of tires has not kept pace with the more severe requirements of heavier and faster vehicles; furthermore there is nothing to indicate that tires for lighter and slower cars have materially improved.

A false impression may be easily gained from the reports of the St. Louis tour, where, according to the newspapers, hundreds of miles were made without repairs. The manufacturers had fitted their cars with new tires and the tire makers had probably taken special pains with their product. One can judge better by the experiences of fifteen or twenty club friends than by "ads." My own observation extends over two seasons' use of single tubes under a 1,200-pound light road wagon. From April to December the four new tires were not punctured and they were not blown up from August 26 to January 1. They were carefully used and frequently examined, tacks and sharp stones were extracted and the holes were filled with jiffy.

In 1904 these tires began to fail—one does not epect them to last forever. One gave out, was sent to the factory to be revulcanized and was replaced by a new one from the same firm. This new one blistered badly after about one month and 300 miles of use. It was also leaky at many points, but a dose of soapstone and water made it hold air two weeks without repumping. The auto agency through which the tire was purchased advised returning and sent the tire back before it was much worn. The factory advised that they found nothing wrong in the construction and would repair it for $5. I told the agent to wire them to return tire unrepaired, as their advice was unsatisfactory. They replied that they had cut it in making examination and would repair it free of charge, which they did after three weeks' delay. On being thus trapped one would have expected a good job, but the revulcanized air tube would not hold up two hours. In fact, the makers had completed the destruction of what was a defective tire in the beginning.

Contrast with this the prompt action of the auto company in sending me new cups, cones and steering knuckle, without charge, when a ball broke, and in shipping a dust protector, without charge, which was not in my contract. The auto maker wants to sell cars, but the tire maker don't care. This attitude does not improve goods and is dealing the whole auto business an "undercut." One friend is trying a semi-solid tire; another is using a filler; solid tires are used some and talked a good deal. Everyone is, of course, reluctant to abandon the pneumatic, but the present situation cannot be satisfactory to motor maker, seller or user. The results would be more encouraging if the tire makers gave more effort to producing tubes for the common herd rather than relying on mile-a-minute records as recommendations.

I had expected to change my rims and use double tubes, but the reports of others do not offer much relief to the user of a light wagon. S.

Editor HORSELESS AGE:

Let your editorial entitled "The Tire Bugbear" be the tocsin for the uprising of the purchasing public against that most exasperating nuisance—the pneumatic tire. How much longer will motor car users patiently suffer this nuisance to continue, when by acting together as a unit the purchasing public can insist on manufacturers getting busy to rid the motor car to it. It is time for the revolt alluded to in your editorial to come right now. It should come before drop forged axles and running gear parts are standardized and the expensive machinery for their manufacture is installed. After that the change that must come in tires would be costly and long deferred. Eventually we are bound to come down to a less resilient, but serviceable tire; to good spring suspension, and a running gear which will stand the changed conditions. The sooner the change is made in tires, wheels, axles, knuckles and springs the better it will be for users, the manufacturers, and the general automobile movement all 'round. The change must be made. Why stagnate any longer where we are. It is up to the user right now to make known what he wants and insist on it.

I do not speak for the owners of racing cars, who tear along the highways at a record-smashing pace; or for the owners who are so happily fixed in the world that wasted time and cash in bursts and punctures count for nothing. Let the manufacturers use up their pneumatics on such as want them; but for the rest of us, let us have tires that are serviceable and always reliable. Cars properly designed for the latter tires can be fitted with the former, except in cars for racing—and they are in a class by themselves.

I have in mind a tire I saw four years ago, an indurated fabric tire. That tire had been used for seven thousand miles, so the makers claimed, and from what I saw I believed it. That tire never gave out from burst or puncture, for the simple reason that it was solid. It never tore from the rim and wrecked its driver, for the good reason that it was bolted on. It never flaked or gouged out great chunks on flint or car tracks, for the reason it was laminated with tough layers of fabric vulcanized in on edge. That tire gave seven thousand miles of faithful service, and was worn out; but worn out as the sole of a man's shoe wears out—by gradual, even wear all over the tread.

This tire was not highly resilient, but more resilient than an iron tire, and more so than a wooden tire. It had some resilience; also gave good traction; was hard to skid on stone or asphalt; was noiseless, and, above all, was always reliable and wore well.

Let our coming cars for touring and every-day pleasure and business use be designed with wheels and axles to bear a less resilient tire. Let our springs be nearly straight and long—platform or semi-platform if need be. Let the main leaves be Norway iron; or, if of steel, then only oil-tempered Swedish steel. Let the leaves be broad, thin and numerous. Then give us a tire on the order of the example we have seen above. WALTER S. VOLKMAR.

Why the Engine Wouldn't Start.

Editor HORSELESS AGE:

Perhaps you may be interested to know the causes for my engine not starting promptly as per my inquiry two weeks since. After satisfying myself there was no other cause for the trouble than the new cam, I put on the old one for trial, and the engine started on the first turn, proving the point of trouble. Upon comparison of the two cams, I noted that the relief lift was exactly opposite the exhaust lift on the new cam, while on the old cam it was about ¼ inch earlier. The New York people did not think this the cause for not starting, but as they could find nothing else they concluded to move the relief lift as an experiment. The engine started on the first turn. They could not say why this one engine should require the relief cam placed differently from all others. Can you?

FRED LOCKWOOD.

(We cannot.—Ed.)

We forgot in our last issue to say one of those automodevils passed through here. It was a fine one, but when she struck Knowlton's plastering sand she stopped all right.—Berling (Wis.) Courant.

List of New York Show Exhibitors.

Announcement has been made of the spaces allotted to those who will exhibit in the Fifth Annual Automobile Show in Madison Square Garden, New York, January 14 to 21, and it will be seen that a far greater number of exhibitors have been cared for than ever before. In all, there are about 250 exhibitors, each of whom has received a diagram, showing the space he is to occupy. Diagrams are issued for the main floor, the elevated platform, the balcony, the exhibition hall, the restaurant and the concert hall, which includes every available inch of space in the big amphitheater.

In making the allotment the committee in charge, which consisted of James C. Young, manager of the show; S. A. Miles, National Association of Automobile Manufacturers, and S. M. Butler, Automobile Club of America, provided for every application received prior to October 27, arranging it so that every manufacturer could exhibit at least one of each of his models. Something like a dozen applications have been received which cannot be accommodated. Following is a complete list of those who will exhibit:

MAIN FLOOR.

J. Stevens Arms & Tool Co.
White Sewing Machine Co.
Elmore Mfg. Co.
Olds Motor Works.
Buckmobile Co.
Baker Motor Vehicle Co.
Worthington Auto Co.
Waltham Mfg. Co.
Matheson Motor Car Co.
Peerless Motor Car Co.
Corbin Motor Vehicle Corp.
F. B. Stearns Co.
Pope Mfg. Co.
Standard Motor Con. Co.
Locomobile Co. of America.
Mitchell Motor Car Co.
Kirk Mfg. Co.
Haynes-Apperson Co.
Geo. N. Pierce Co.
Cadillac Automobile Co.
Ford Motor Co.
Upton Motor Co.
Grout Bros. Auto Co.
Electric Vehicle Co.
Autocar Co.
Phelps Motor Vehicle Co.
Winton Motor Carriage Co.
Knox Automobile Co.
E. R. Thomas Motor Co.
Royal Motor Car Co.
Fischer Motor Vehicle Co.
Vehicle Equipment Co.
Covert Motor Vehicle Co.
National Motor Vehicle Co.
Smith & Mabley Mfg. Co.
H. H. Franklin Mfg. Co.
Thos. E. Jeffery & Co.
Northern Mfg. Co.
Duryea Power Co.
Apperson Bros. Auto Co.
Automotor Co.
Crest Mfg. Co.
Reliance Auto Mfg. Co.
American Motor Co.
Daimler Mfg. Co.
Lane Motor Vehicle Co.
Packard Motor Car Co.
Studebaker Bros. Mfg. Co.
Prescott Auto Mfg. Co.

ELEVATED PLATFORM.

Hartford Rubber Works Co.
Rose Mfg. Co.
Fisk Rubber Co.
Dayton Electrical Mfg. Co.
Standard Welding Co.
Dow Portable Electric Co.
Timken Roller Bearing Axle Co.
Warner Gear Co.
Herz & Co.
Pope Mfg. Co.
Jos. W. Jones.
Morgan & Wright.
India Rubber Co.
R. E. Hardy Co.
N. Y. & N. J. Lubricant Co.
National Carbon Co.
Firestone Tire & Rubber Co.
Gleason-Peters Air Pump Co.
Shelby Steel Tube Co.
Badger Brass Mfg. Co.
American Ball Bearing Co.
20th Century Mfg. Co.
Pittsfield Spark Coil Co.
Light Mfg. & Foundry Co.
American Coil Co.
Brennan Motor Co.
Phineas Jones & Co.
Broscoe Mfg. Co.
Columbia Lubricants Co.
Springfield Metal Body Co.
Parish & Bingham Co.
Weston-Mott Co.
Baldwin Chain & Mfg. Co.
American Roller Bearing Co.
Whitney Mfg. Co.
The Veeder Mfg. Co.
G. & J. Tire Co.
Goodyear Tire & Rubber Co.
Diamond Rubber Co.
Brown-Lipe Gear Co.
Midgely Mfg. Co.
Gray & Davis.
C. F. Splitdorf.
R. E. Dietz Co.

UPPER BALCONY.

Post & Lester.
Green-Tweed & Co.
Chas. E. Miller.
Wm. H. Brown.
Standard Oil Co.
Edison Storage Battery Co.
Demmerle & Co.
Motor Car Equipment Co.
Chas. H. Metz.
Breeze Motor Mfg. Co.
United Elec. Mfg. Co.
The Lunkenheimer Co.
Rushmore Dynamo Works.
Dr. T. J. Cooper.
Auto Supply Co.
A. H. Funke.
Electric Contract Co.
Leon Rubay.
De Laski & Throop Tire Co.
English & Mersick Co.
D. McRa Livingston.
Continental Caoutchouc Co.
Hendee Mfg. Co.
Reliance Motor Cycle Co.
Trebert Auto & Marine Motor Co.
Columbia Nut & Bolt Co.
Pneumatic Tire Protector Co.
Scandinavian Fur & Leather Co.
Scoville & Peck Co.

BALCONY EXTENSION.

W. J. Duane & Co.
Wm. Roche.
Wm. Cramp & Sons Ship & Eng. Co.
America Co., Inc.

EXHIBITION HALL.

Mack Bros. Co.
Chicago Automobile Mfg. Co.
Pierce Engine Co.
Central Automobile Exchange.
Marble-Swift Auto Co.
Lionel Norman.
Springer Motor Vehicle.
Michigan Automobile Co.
Jackson Automobile Co.
Austin Automobile Co.
Oscar Lear Automobile Co.
Warwick Cycle & Auto Co.
Coldwell Lawn Mower Co.
Reid Mfg. Co.
Marion Motor Car Co.
The Lozier Motor Co.
Sturtevant Mill Co.
United Motor & Vehicle Co.
Buick Motor Car Co.
Upton Machine Co.
Pungs-Finch Auto & Gas Eng. Co.
Morse Motor Vehicle Co.
Eisenhuth Horseless Vehicle Co.
Columbus Motor Vehicle Co.
Howard Motor Car Co.
Bartholomew Co.
J. G. Parsons.
Standard Wheel Co.
Welch Motor Car Co.
J. L. Dolson & Sons.
Torbenson Gear, Inc.
The Union Automobile Co.
Toquet Motor Car & Const. Co.
Berkshire Automobile Co.
Model Gas Engine Works.
Regas Automobile Co.
Acme Motor Car Co.
James Brown Machine Co.
Warren Automobile Co.

RESTAURANT.

Premier Motor Mfg. Co.
Wayne Automobile Co.
H. H. Buffum Co.
Reo Car Co.
Pope-Robinson Co.
Panhard & Levassor.
De Dietrich & Co.
Worthington Auto Co.
Maxwell-Briscoe Co.
C. H. Blomstrom Motor Co.
Commercial Motor Co.
Norris N. Mason, F. I. A. T.

is de l'Automobile.

First Tier Boxes.

York Edison Co.
gue Umbrella Co.
:lock Coil Pipe Co.
:entrated Acetylene Co.
iey Drop Forge & Mfg. Co.
-Watt Co.

Central Boxes.

t Roller Bearing Co.
. E. Miller.
. Goodrich Co.
. Willis Co.

Concert Hall.

e-Kingston & Co.
.ehart Clincher Tire & Rubber Co.
:land Car Specialty Co.
Tokheim Mfg. Co.
inger Device Co.
rle-Johnson Machine Co.
ner Instrument Co.
r Pump & Register Co.
coil Co.
-Bright Mfg. Co.
oit Steel Products Co.
ıfacturers' Foundry Co.
rial Wheel Co.
ral Mfg. Co.
onal Car Wheel Co.
. Mezger.
:r Mfg. Co.
ra Automatic Machine Co.
sylvania Rubber Co.
m & Sharpe Mfg. Co.
Bowser & Co., Inc.
A. O. Smith Co.
iehan Odometer & Mfg. Co.
Webb Co.
Ball Co.
Jersey Brake Co.

of Allotments for Chicago Show

ere will be about 170 exhibitors at the ıgo show, of whom 80 will exhibit and 90 parts and accessories. The : in the gallery was allotted by mmittee representing the Motor and ssory Manufacturers. All of it was ı by members, so that it was necessary ıandon the restaurant, which has here- e been on the second floor of the an- for the benefit of non-members. Of the nobile exhibitors, an even score have : before shown at Chicago. There are cations on the waiting list for five ex- ; of complete cars and twice as many ccessories.

e complete list follows:

Automobile Manufacturers.

: Motor Car Co.
rson Bros. Auto Co.
ırn Automobile Co.
in Automobile Co.
car Co.
:. Banker Co.
Bartholomew Co.
. Blomstrom Motor Co.
c Motor Car Co.
: Mfg. Co.
lac Automobile Co.
Chicago Auto & Mfg. Co.
Chicago Motorcycle Co.
Coldwell Lawn Mower Co.
The Columbus Motor Vehicle Co.
Covert Motor Vehicle Co.
Crest Mfg. Co.
John L. Dolson & Sons.
Duryea Power Co.
Electric Vehicle Co.
Elmore Mfg. Co.
Ford Motor Co.
H. H. Franklin Mfg. Co.
Hagmann & Hammerly.
Haynes-Apperson Co.
Holsman Auto Co.
Jackson Auto Co.
Thomas B. Jeffrey & Co.
Kirk Mfg. Co.
Knox Auto Co.
Locomobile Co. of America.
The Marble-Swift Auto Co.
The Marion Motor Car Co.
Maxwell-Briscoe Motor Co.
Mead Cycle Co.
Michigan Auto Co.
Mitchell Motor Car Co.
Model Gas Engine Works.
National Motor Vehicle Co.
Northern Mfg. Co.
Olds Motor Works.
Packard Motor Car Co.
Peerless Motor Car Co.
The George N. Pierce Co.
Pierce Engine Co.
Pope Motor Car Co.
Premier Motor Mfg. Co.
Pungs-Finch Auto & Gas Eng. Co.
Regas Auto Co.
The Reid Mfg. Co.
Reliance Motor Car Co.
Reo Car Co.
Royal Auto Co.
Royal Motor Car Co.
Simplicities Auto Co.
The Sommer Motor Co.
Standard Wheel Co.
The F. B. Stearns Co.
J. Stevens Arm & Tool Co.
St. Louis Motor Carriage Co.
Stoddard Mfg. Co.
Studebaker Bros. Mfg. Co.
E. R. Thomas Motor Co.
Tincher Motor Co.
The Union Auto Co.
Vehicle Equipment Co.
Waltham Mfg. Co.
Welch Motor Car Co.
White Sewing Machine Co.
Winton Motor Carriage Co.
Woods Motor Vehicle Co.
Worthington Auto Co.

Parts and Accessory Manufacturers.

American Roller Bearing Co.
Aurora Automatic Machinery Co.
Autocar Equipment Co.
The Autocoil Co.
Badger Brass Mfg. Co.
Baldwin Chain & Mfg. Co.
The Beckley-Ralston Co.
S. F. Bowser & Co., Inc.
Brennan Mfg. Co.
Briscoe Mfg. Co.
W. H. Brown.
Brown-Lipe Gear Co.
Byrne, Kingston & Co.
Chicago Battery Co.
Chicago Rawhide Mfg. Co.
Chicago Storage Battery Co.
Continental Caoutchouc Co.
Cullman Wheel Co.
Dayton Electrical Mfg. Co.
Detroit Steel Products Co.
The Diamond Rubber Co.
R. E. Dietz Co.
Jos. Dixon Crucible Co.
Dow Portable Electric Co.
A. L. Dyke Auto Supply Co.
Electric Contract Co.
Excelsior Supply Co.
Fawkes Rubber Co.
Federal Mfg. Co.
Firestone Tire & Rubber Co.
The Fisk Rubber Co.
G & J Tire Co.
The B. F. Goodrich Co.
Goodyear Tire & Rubber Co.
Gray & Davis.
Greene, Tweed & Co.
The R. E. Hardy Co.
The Hartford Rubber Works Co.
Hendee Mfg. Co.
Herz & Co.
Hine-Watt Mfg. Co.
William Hjorth & Co.
Hyatt Roller Bearing Co.
Imperial Wheel Co.
India Rubber Co.
Chas. Kaestner Mfg. Co.
G. B. Kimball & Co.
McGiehan Odometer & Mfg. Co.
The Miller-Knoblock Electric Mfg. Co.
Morgan & Wright.
The Motor Car Supply Co.
Motsinger Device Mfg. Co.
National Carbon Co.
Oliver Mfg. Co.
The Pantasote Co.
Pennsylvania Rubber Co.
Pope Mfg. Co.
Pneumatic Tire Protector Co.
Remy Electric Co.
William Roche.
Rose Mfg. Co.
Shelby Steel Tube Co.
G. F. Splitdorf.
The Sprague Umbrella Co.
Standard Carriage Lamp Co.
Standard Oil Co.
The Standard Welding Co.
The Steel Ball Co.
Swinehart Clincher Tire & Rubber Co.
Timken Roller Bearing Axle Co.
The Tokheim Mfg. Co.
Twentieth Century Mfg. Co.
The Veeder Mfg. Co.
Vesta Accumulator Co.
Warner Gear Co.
Warner Instrument Co.
The Webb Co.
Wheeler Mfg. Co.
Whiteley Steel Co.
The Whitney Mfg. Co.
E. J. Willis & Co.
Wray Pump & Register Co.

LEGISLATIVE AND LEGAL.

RYE, N. Y.—A crusade against automobile scorching was started on Saturday, November 19, when twenty special deputies were sworn in for the purpose. By the end of the day twenty-two automobilists had been stopped and $315 collected in fines. The victims were mostly New Yorkers en route to New Haven for the Yale-Harvard football game.

NEW YORK, N. Y.—Papers have been filed in the suit of Clarence E. Sherin vs. Police Commissioner McAdoo. The case arises from the new traffic regulations recently put in force by the police. The plaintiff alleges that Mr. McAdoo has exceeded his authority in closing certain streets, notably Thirty-fifth street, to traffic during certain hours of the day. He was arrested for driving on it in his car in spite of a warning from a police officer.

SPRINGFIELD, OHIO.—Mrs. Virginia Wilkins, of Urbana, has sued the Clark County Commissioners for $20,000 for injuries alleged to have been received when an automobile in which she was riding was wrecked because of a defective road.

WAUKESHA, WIS.—Mrs. William Keppen has begun suit against George H. and Fred D. Clark, of Evansville. She and her husband were riding in a wagon on August 27, when, it is claimed, an automobile driven by the Clarks frightened the horse and the plaintiff was injured.

KANSAS CITY, MO.—Only two licenses have been taken out in the two months during which the new ordinance has been in force. The examining board has asked the Mayor to devise a means of bringing the automobilists into compliance with the law.

BUFFALO, N. Y.—The fire commissioners have prepared a communication to the board of aldermen asking them to pass a new ordinance regulating the sale and handling of gasoline. The present measure is made obsolete by the new order of things.

PHILADELPHIA, PA.—In a speech at the annual meeting of the Camden County Board of Agriculture Henry S. Scovel, father of the New Jersey automobile law, stated that at the next meeting of the legislature he would propose the following amendments to the law: "First, for every violation of the act, arrest without a warrant. Second, reduce the speed limit to whatever may be deemed proper. The speed limit of twenty miles an hour that is in force now is excessive. Third, that automobiles while in this State, shall display only the number of the State on the back."

KANSAS CITY, MO.—Automobilists are preparing to test the validity of the recently passed ordinance which provides for examining and licensing of operators.

PITTSBURG, PA.—George Munson, chauffeur, has been fined $35 and is the first to be convicted under the automobile act of 1903. In passing sentence Judge Evans took occasion to warn automobilists that the act provides for either a fine or imprisonment, and that future offenders would not be dealt with so leniently.

WILKESBARRE, PA.—The directors of the Elmhurst Boulevard Co. have notified the motorists of the vicinity that speeding on the boulevard will not be permitted, and that if after a warning an operator persists in the practice, he will be barred from the road altogether.

WATERVILLE, ME.—A verdict for the plaintiff has been returned in the Supreme Judicial Court in the case of A. O. and Mary Lombard vs. A. S. Burke, damages being assessed at $400. The suit resulted from a collision between the plaintiff's car and a dog owned by the defendant, as a result of which the plaintiffs were injured and the car damaged.

FAIRBURY, ILL.—An automobile ordinance has recently become operative. It provides for a speed limit of eight miles an hour between, and six miles an hour at crossings. The minimum penalty is $5, and the maximum $200 fine for each offense.

LOUISVILLE, KY.—At a hearing before the railroad and revision committee of the city council at which a number of automobilists were present, Alderman Harris agreed to drop his proposed ordinance. At the present time there is an ordinance in force which is satisfactory to all concerned. Mr. Harris' measure provided for the examination of operators.

TAUNTON, MASS.—At a recent meeting of the committee on streets and bridges of the city council an ordinance was presented which provides that "no person having the care or control of an automobile or self-propelled vehicle" shall drive said vehicle at a greater speed than eight miles an hour when within one and one-half miles of the city hall. The maximum penalty is $20 fine. The bill will be printed and then referred to the council for action.

Since printing the item regarding how to get small pieces of metal out that have accidentally dropped into a cylinder, a number of other methods have been suggested for accomplishing the same purpose. A correspondent in a French contemporary suggests to besmear the end of a screw driver or other tool with heavy grease and insert it into the cylinder to the point where the piece to be removed may be lodged, when the piece will most likely adhere to the tool. One of our readers suggests that a wire be wrapped around the screw driver a number of times and connected to the sparking battery; if the screw driver is then inserted into the cylinder any small free iron pieces in the cylinder will be attracted and held by it, and may thus be removed.

Commercial Vehicle Notes.

Plans are on foot to establish a system of automobile busses on the streets of Sioux Falls, S. D.

The American Express Co. expects to equip their Manchester, N. H., branch with motor propelled delivery wagons in the near future.

The Los Angeles, Cal., City Council has appropriated $2,300 for the purchase of an electric patrol wagon for the police department.

A gasoline motor track car has been put in operation lately on the Sioux City, Homer & Southern Railway in Nebraska. The line connects the Winnebago Indian reservation and Sioux City, Ia., and is twenty-four miles long.

A company has been organized to operate an automobile stage line between Trenton and Yardville, N. J., to compete with the street railway company, who have lately reduced the number of cars running between these points. Morris & Co., the Union Oilcloth Co., and a number of individuals are said to be interested in the venture.

A public hearing was given in Boston on November 15 by the aldermanic committee on licenses on the petition of J. J. Busch for a license for an automobile route with a stand in front of the Granary burying grounds. The various officers of the Cab Drivers' Union and the Boston Cab Co. were present as remonstrants. The point of their argument was that the automobile operators are not under the same police restrictions as are the cab drivers and can therefore regulate rates and routes to suit themselves and use methods of soliciting business which are denied them by law. The committee took the matter under advisement.

New Incorporations.

The Peerless Motor Car Co., New York, N. Y. Capital, $50,000. Directors, C. G. Wridgway, C. T. Anderson, L. H. Kittredge.

The Motor Car Equipment Co., New York City. Capital $25,000. Directors: Emil Grossman, Carl Kaufman, E. J. Kestenbaum.

Mobile Motor Car Co., Mobile, Ala. Capital, $15,000. Incorporators: Robert Morris, A. J. Spencer, M. Van Veuvel, Joseph Stone.

All-Around Philadelphia Automobile Co., Washington, D. C. Capital, $50,000. Incorporators: Frank C. Berens, S. Burkhart, Emmert, C. Bernard Werle.

Bennett-Bird Co., Chicago to manufacture automobiles. Capital, $10,000. Incorporators: A. G. Bennett, G. H. Bird, Mark Breeden, Jr.

The Wayne Automobile Co., Detroit, Mich. Capital, $300,000.

Club Notes

A. C. A.

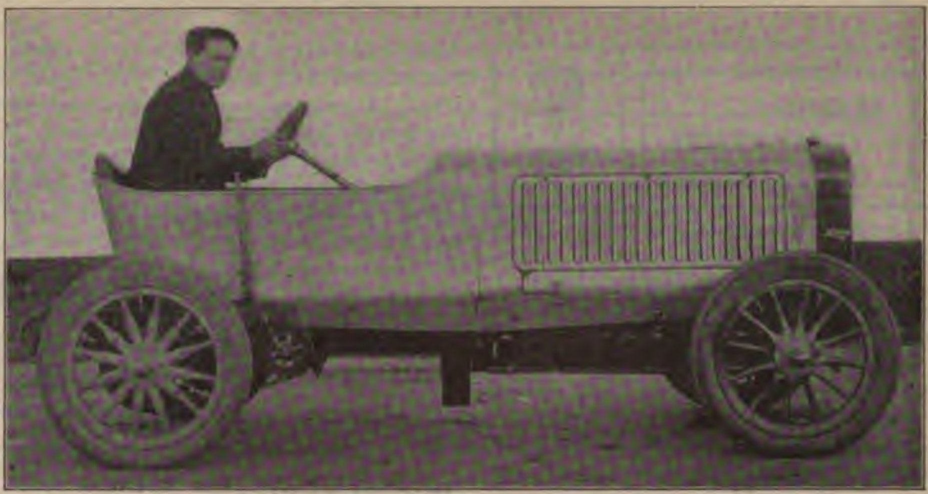
The annual meeting was held on Monday, November 21. Reports were presented by the various officers and committees, and the retiring president, W. E. Scarritt, made a lengthy address. The regular ticket named by the nominating committee was elected by acclamation. The new officers are, therefore: President, Dave Hennen Morris; first vice-president, Colgate Hoyt; second vice-president, William K. Vanderbilt, Jr.; third vice-president, Clarence Gray Dinsmore; treasurer, Samuel H. Valentine. Governors, to serve three years, James L. Breese, Melville D. Chapman and Harlan W. Whipple.

N. Y. STATE A. OF C.

The board of directors met in Syracuse on November 19. Considerable routine business was transacted. The legislative committee was instructed to prepare a bill to be presented at next session of the legislature making it a misdemeanor for a chauffeur to drive a car without the owner's permission. With such a bill in force it is believed a large percentage of automobile casualties can be avoided. A banquet was held in the evening.

SPRINGFIELD (MASS.) A. C.

Nearly fifty members and guests sat down to the annual club banquet at the Highland House on November 16. Good roads and favorable legislation were the chief subjects discussed by the speakers. Judge Kellogg, of the Westfield Court, said that in his opinion the speed limit should be twenty-five miles per hour in sparcely settled districts. He pointed out the weakness of laws which make divisions of the fines with those securing convictions. Among the speakers were: Harlan W. Whipple, C. H. Gillette, E. C. Lee, Asa Goddard, and President L. J. Powers.



POPE-TOLEDO 90 HORSE-POWER RACER

A. C. OF GERMANTOWN, PA.

Cards are out announcing the opening of the new club house at Carpenter and Elmer Streets, on the evening of November 23.

NEW BRITAIN (CONN.) A. C.

In an effort to increase its membership the club has sent out invitations to motorists in Berlin, East Berlin, Kensington, Plainville, Forestville and Bristol, to enlist on the club rolls.

PITTSBURG A. C.

The proposed endurance run to Mercer has been abandoned on account of the unfavorable condition of the roads. Plans are on foot for a series of smokers for the winter months at which vaudeville and musical programs will be offered.

N. Y. MOTOR CLUB.

At a meeting held on November 18 it was decided to incorporate the club. For that purpose a temporary board of directors was appointed, composed of C. H. Hyde, Frank J. Griffen, S. A. Miles, A. L. McMurtry, W. J. P. Moore, Sidney B. Bowman, Isaac B. Potter, H. A. Lozier and W. J. Morgan. It was voted to foster and promote motoring in the air. A constitution and by-laws were adopted.

LOUISVILLE (KY.) A. C.

About twenty-five members appeared before the committee on railroads and revision of the board of aldermen at their public hearing last week on the automobile ordinance proposed by Alderman Harris. As a result of their efforts the ordinance will be dropped.

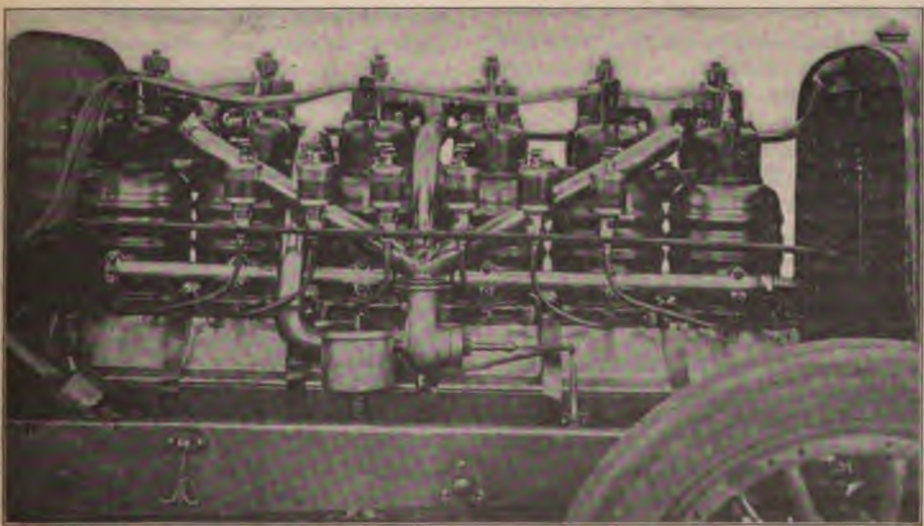
90 H. P. Pope-Toledo.

We show herewith photographs of the new Pope-Toledo racing car which has been entered by the Pope Motor Car Co. for the Ormond-Daytona record trials and also of its 90 H. P., six-cylinder motor. The latter has a bore and stroke of six inches and is designed along lines similar to those of the company's smaller cars. The drive is by bevel gear to a countershaft and by side chains to the rear wheels. It is said that on the high speed the crank and driving wheels are geared one to one.

Amendments to Gordon Bennett Cup Race Entry Conditions.

The racing committee of the Automobile Club of America announced last week certain changes in the conditions which govern the entries of cars of American manufacture for the Gordon Bennett Cup race. The date at which cars must be placed at the disposal of the committee has been changed from April 15, to May 1, and at that time each entrant must file with the secretary of the club an affidavit to the effect that his car has been entirely completed for a period of over two weeks. Entries will close on December 15.

In the article on sliding pinion change gear design in our issue of November 9th, the width of the low-speed pinions of the Pierce gear, which is 1 inch, was erroneously given as 7/8 inch. The bore of cylinder was also at one place given as 3 5/16 inch, instead of 3 13/16 inch, but this was merely a typographical error and the true bore was used in the calculations



POPE-TOLEDO RACER—VIEW OF ENGINE.

MINOR MENTION

The New Kensington (Pa.) Automobile Co. are erecting a new factory.

The C. H. Blomstrom Motor Co., Detroit, Mich., are making extensive additions to their plant.

The Rhodes Manufacturing Co., Grand Rapids, Mich., are putting out a new clincher tire remover.

The Adwear Auto Tire Sleeve Co., North Attleboro, Mass., have recently organized to make tire sleeves.

The Wolverine Motor Car Co., of Detroit, Mich., purpose to move to Fort Wayne soon.

T. J. Blake & Son, Hartford, Conn., have recently put upon the market a special alloy for automobile use, called Hercules Bronze.

The capital of the Hanson Automobile Works of Chicago has been increased from $1,500 to $2,500.

The capital stock of the Welch Automobile Co., of Pontiac, Mich., has been increased from $50,000 to $100,000.

The Electric Supply Co. of Savannah, Ga., will soon occupy a one-story brick garage which is building on Liberty Lane.

The Denver (Col.) agency for the Reo car has been taken by the Barclay Automobile Co. of that city.

The first automobile races to be held in South Carolina will be run off at Charleston on Thanksgiving Day.

Joseph Heller, who is to import Pipe cars, made in Belgium, has taken quarters at 1722 Broadway, New York City.

There is a movement on foot to make entries for the Ormond-Daytona record trials open to all instead of by invitation, as is now the case.

The Butler, Ind., Arc Light Co. are moving into a new factory and will manufacture the Burke Automobile Climber—an "anti-skid" device of their own design.

The Electric Vehicle Co. has commenced suit against Henry and Albert C. Neubauer, managers of the Palais de l'Automobile, the New York branch of Panhard & Levasser, for infringement of the Selden patent.

The L. H. Fawkes Co., with J. S. Spargo, as manager, opened an automobile sales room last week at 93 East Fifth Street, St. Paul, Minn., and have taken the agency for the Rambler cars.

The Harrison Wagon Works of Grand Rapids, Mich., are reported to be building a number of experimental cars with a view to entering the automobile manufacturing business.

In a report, submitted at their request to the Nassau County (L. I.) Board of Supervisors, Alfred Reeves states that the cost of the Vanderbilt Cup race to the A. A. A., contestants and others, aggregated $550,000.

The Fisk Rubber Co., of Chicopee Falls, Mass., have taken out a license to manufacture tires with the Bailey "Won't Slip" tread. They have also arranged to furnish the Samson leather cover on their tires.

The Standard Roller Bearing Co., of Philadelphia, have recently purchased a quantity of land in the neighborhood of their plant and will erect a steel casting foundry and an addition to their steel bolt factory.

Automobilists of Brunswick, Me., are planning to form a club and it is proposed to invite those in Bath to join with them in the organization of an inter-city association.

The Republic Rubber Tire & Shoe Co., of 138 West 52d Street, New York City, have brought out a "nonskid" leather cover which, it is said, can be attached to any make of tire.

The Royal Automobile Co., Cleveland, O., have filed an amendment to their charter, which provides for an increase in their capital stock to $250,000, $100,000 of which is to be preferred.

On the 10th the Autocar Co., Ardmore, Pa., celebrated the opening of their new shop by a lunch participated in by their 400 employees and the workmen engaged on the new building.

The Springfield (Mass.) Hat and Cap Co., are putting out a portable rubber basin which is provided with compartments for soap and towels and can be folded to fit in the tool box of a car.

The N. A. A. M. has declined to sanction the automobile show which had been planned for St. Louis in January. It is likely that the date will be changed to May or June.

Miss Anna Buddick, of Stockton, Cal., was killed on November 13. She was riding on the rear part of an automobile with her feet hanging over, when her skirts caught in the chains and she was thrown to the pavement and dragged for some distance.

The firm of Whitten & Clark, Springfield, Mass., have reorganized, Mr. Whitten having resigned, and are now known as the E. R. Clark Automobile Station. They have taken the E. R. Thomas Motor Co. agency for 1905.

The Hiland Automobile Co., recently organized in Pittsburg, Pa., is erecting a saleshouse at Baum and Beatty Streets. The officers of the company are: Dr. John A. Hawkins, president; Dr. George A. Urling, treasurer; F. W. Anderson, secretary.

The Corbin Motor Vehicle Co., of New Britain, Conn., will soon move into the old plant of the New Britain Knitting Co. The company expect to make a small car of medium price as well as their touring car, during 1905.

The James Brown Machine Co., of Pawtucket, R. I., have succeeded the United Motor Corporation and will manufacture the Cameron cars. For 1905 they expect to market a car with a two-cylinder air cooled motor, and a larger one with a three-cylinder motor.

Miss Helen Walker, of St. Louis, has filed an attachment suit against the Grout Bros. Automobile Co., of Orange, Mass., for $700. She alleges that the automobile which she purchased from the defendant company was not, as represented, easy to manage, and did not give satisfaction.

The Mobile Motor Car Co. was organized at Mobile, Ala., on November 10, with a capital stock of $15,000. The officers of the company are Robert Morris, president; A. J. Spencer, first vice-president; M. Van Veuvel, second vice-president; Joseph Stone, secretary.

It is próbable that the Essex County (N. J.) Board of Freeholders will soon widen and improve the plank road between Jersey City and Newark. This road is the most direct route from New York to Newark and vicinity and would be much used by motorists if in better condition.

Smith & Mabley, of New York City, are said to have made an arrangement with Allen, Halle & Co., whereby the former concern secures the selling rights for the Mercedes cars in America. Smith & Mabley, being members of the A. L. A. M., Mercedes cars will henceforth be sold under Seldon licenses in this country.

James Bradley and G. Feltman, machinists and bicycle dealers, have purchased a building at 22 Plain street, Albany, N. Y. The building has a main floor, 100x40 feet, which will be used for storage purposes, and three other floors on which a machine shop will be installed. The firm intends to engage also in the agency business.

The New Jersey A. C. held a race meet for amateur drivers in stock cars on November 19. The winners were: I. M. Upperau (Cadillac), A. E. Reid (Orient), R. T. Newton (Autocar), E. Strasser (Locomobile), A. W. Stockbridge (Locomobile), M. Roberts (Thomas). B. M. Shanley, Jr., in a 90-h.p. Mercedes, drove in an exhibition trial, making 4½ miles in 5:56 1-5.

While rounding a sharp curve in their car in a narrow gorge near Santa Barbara, on November 12, G. E. Bailey and wife, of San Francisco, Cal., came suddenly upon a herd of steers, who stampeded through fright at the car and in endeavoring to rush by forced the car over the edge of a cliff, badly wrecking it. The occupants escaped without injury.

On the morning of November 18 John Clemons, a farmer, was found pinned in a blanket lying by the side of the Pelham, N. Y., Parkway, suffering from a fractured skull. His wagon was found badly smashed and his horse tethered to a tree a short distance away. Upon recovering consciousness, he stated that while driving over the road in the night a large touring car, running at high speed, struck his wagon and threw him out. The occupants of the car, upon learning his condition left him as he was found, promising to send aid, but failed to do so. George Mack, a chauffeur, has been arrested in connection with the case.

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New Laws Not Needed.

As a means of bringing to an end the long list of serious and sometimes fatal accidents which have occurred of late in the vicinity of New York City through the reckless driving of automobilists, the police authorities and certain members of the Automobile Club of America propose to seek further legislation. The belief exists that the present law is inadequate to cope with the situation and that the remedy for the evil lies in a measure which will provide for penalties other than the fines and imprisonment which may be imposed under the law now in force.

The police authorities are on record as favoring the examination and licensing of all operators, but this proposition has been met by the Automobile Club by the assertion that the drivers who could pass the best examination are the very ones who are the most dangerous on the highway, and that as a preventive of scorching and its consequences, the measure would be ineffectual. As a substitute the automobilists have proposed a law which will provide for the revocation, upon conviction, of the operator's license for a period dependent upon the gravity of the offence and the record of the offender.

We wish to state again, as we have always in the past when the present question has been up for discussion, that the weakness lies not in the law itself, but in the manner in which it is enforced or, rather, not enforced. There is ample protection under the common law against all forms of crime, and when crime exists it is due simply to a laxity in enforcing the law. The automobile has not brought with it any new crimes, but rather has given old ones an opportunity of appearing in new garb. That reckless disregard of the right of others which has been the cause of all crimes from the beginning of things is also the cause of the crimes of automobiling. As the cause has not changed why should the remedy?

Complication of the law results merely in encumbering the statute books, and in affording offenders a greater variety of ways in which to offend. Each new law passed breeds as many new offences as it has clauses and buries still deeper the root of the evil which it is intended to stamp out. It serves merely to obscure the issue and to divert the attention of those in whose charge is the enforcement of the law from the real crimes at which it is aimed to the lesser crimes which it has created.

A man may be licensed to drive an automobile on the public highways, and if he abuses his privileges his license may for a time be taken away, but if this legal deprivation is to have any punitive effect the law must be enforced, and this is absolutely impossible to accomplish. The passage of such an act would mean that the only effective punishment would be put one step further away and the criminal kept just so much the longer from his just deserts,— a term in jail. It would require that the penalty itself be backed by another of greater effect, and that the very one which should have been applied at first.

What is needed is not more laws, but a more vigorous and intelligent enforcement of those now on the books,—modern means of capturing offenders and a proportioning of the penalty to fit the crime, the equipping of the police with speedy means of locomotion and the passing of jail sentences on habitual offenders.

The Hill-Climbing Contest.

The hill-climbing contest at Eagle Rock, N. J., on Thanksgiving Day furnishes additional proof, if any be needed, of the im-

possibility of holding automobile speed contests on public highways without great danger to both spectators and contestants. The event supplies another illustration of the inability of police officers, handicapped as they are on such occasions by a lack of authority, to keep the crowds which attend clear of the course and out of harm's way. The management had made elaborate arrangements for maintaining a clear course and protecting the public, which included roping off corners, stationing police officers at intervals along the road, and employing a system of flag signals to warn spectators of the approach of cars, but it was not because of these precautions that no fatality occurred. They failed miserably to accomplish their purpose for the reason that the power to compel the public to comply with the regulations was lacking, and persuasion availed not.

The people crowded into the road, and at some points the contestants were forced to drive through narrow lanes barely wide enough for their cars, and flanked on either side by rows of human beings three and four deep. The result of the breaking of part of a car, or the faulty steering of some nervous or incompetent operator, under such conditions, is as easy to foretell as it is horrible to contemplate. In fact, it is under just such conditions that the chances for accident are the greatest, for the added strain placed on the driver in watching for the crowd is likely to divert his attention from his duties in connection with his car.

By the time the program had been half completed the crowding had become so bad that President Whipple, of the American Automobile Association, who, it is said, had personally guaranteed the bond for $5,000, which the West Orange Town Council, alive to the danger of the contest, had demanded of its promoters to safeguard the town against any damage suits which might result, stopped the racing and refused to allow it to continue until the course was cleared.

This condition of affairs existed, as has been said, in spite of carefully made plans calculated to avoid it; this same condition of affairs existed at the Vanderbilt Cup race on Long Island, and finally put a stop to it, and this same condition of affairs will always exist as long as automobile speed contests are held on public highways, for the simple reason that a public road is a public thoroughfare, and no one has the *legal right to its exclusive use.*

Automobile Clubs.

Very substantial service has already been rendered the motor vehicle movement through the activity of the many automobile clubs, which have sprung up in all parts of the country, but, as yet, their usefulness has hardly reached its stage of fullest development.

Automobile clubs are so readily formed, are capable of being maintained at such slight expense, and may so easily be made to exert a sensible influence in matters affecting the welfare of automobilists, that they will be found of great use even in small communities.

In any town where there are more than a dozen motorists, an organization may be found. It is only necessary for a few well-known owners of machines to sign and forward a well-worded circular, addressed to all local users of self-propelled vehicles, inviting them to meet at a certain time and place. The response will usually be found cordial, and it is only necessary to enroll as members the persons present, elect officers and adopt a set of by-laws to put the club in working order. No club rooms need be maintained, and not more than perhaps one dollar per year need be charged as dues, for postage and a little printing are likely to be the only necessary expenses. If the

An organization of this kind may voice the united protest of its membership, in case the rights of the automobile are sought to be unduly infringed through legislation, and it may seek, with all the force due to organized numbers, the enactment of more favorable laws governing the use of motor vehicles. It should stand, at all times and seasons, for better roads, crossings and streets, and for better care of existing highways. It may seek to have local highways better equipped with accurate signboards, giving correct distances and directions to various points in the vicinity.

One aim of the club may be to demonstrate to the local authorities the safety, ease of control, and usefulness of the self-propelled vehicle, and it may well strive to prevent the reckless use of motor vehicles within its territory and to wage an incessant war against illegal speeding, the use of "cut" mufflers, and the excessive use of the horn. If the sentiment of the organization, as a whole, is strongly against these abuses, the individual member will be loath to run counter to it. During the winter an occasional lecture talk before the organization will tend greatly to increase technical knowledge of the automobile among the membership.

An entente cordiale maintained with the police and street and park authorities may lead to civilities upon the part of the former and little courtesies or concessions upon that of the latter, which will be found to greatly benefit motorists at large.

Two-Cylinder Vertical Motors.

The double-cylinder vertical motor, which at one time was taken up with some enthusiasm by several well-known automobile manufacturers, appears to be at present almost universally discarded, judging from the infrequency of its employment in cars of late model.

It would seem that these twin-cylinder motors are likely soon to become entirely obsolete and that the double-cylinder motor, if used at all, will be almost universally of the opposed type.

In point of fact, the twin-cylinder, four-cycle engine has never had much excuse for being. Its torque is altogether too fluctuating and unsymmetrical to conform to present-day standards, it is not greatly superior to the single-cylinder motor so far as the question of vibration is concerned, and it has as many parts as does the opposed cylinder engine, with hardly any of its virtues. It may be regarded merely as a tentative or temporary form, intermediate between the single engine and the balanced forms represented by the four-cylinder and three-cylinder types.

General practice in automobile engine forms, at present, seems to comprise the use of the single, horizontal cylinder upon very small runabouts (although this type is rapidly being supplanted); the employment, to an increasing extent, of the opposed two-cylinder engine, in a forward location, upon runabouts and light touring cars, and a very general adoption of the vertical four-cylinder engine upon touring cars of any serious pretentions.

Little headway seems to be made by the triple-cylinder motor, despite its many excellent qualities, and it would not be strange if the immediate future might see the field almost monopolized by the four-cylinder engine and the two-cylinder motor of the opposed type, furnishing motive power respectively for vehicles of high and comparatively low power.

Preparing a Car for the Winter's Rest.

By Albert L. Clough.

The season is now at hand, when, except in certain favored localities, motorists are generally preparing to put their cars into Winter quarters. For those who live in cities, this total discontinuance of the use of motor vehicles is not so much a matter of necessity as one of preference, for in point of fact, automobiles *can* be used, under urban conditions, during all but a comparatively few days of the Winter season; but, as the vast majority of motor cars are avowedly pleasure vehicles, and as little or no pleasure is to be obtained from driving during cold weather, no matter how capable the vehicles themselves are of overcoming the severe conditions it is good judgment to give the faithful car a rest and not punish oneself by heroic attempts to get fun out of a swiftly moving vehicle on a zero day.

To users who live in the country or in small towns the "jacking up" process is unavoidable; for no self-propelled vehicle can profitably be used amidst the snowdrifts which encumber the roads of the major part of the country, and such users may be pardoned for envying the denizens of Southern California and of Florida and the other Gulf States, the superiority of their climate which gives them an automobiling season lasting practically the year round.

Those fortunate individuals who possess continuously heated stables, are spared the painful necessity of putting their cars entirely out of commission. Vehicles housed under these favorable conditions, will have their lubrication and cooling systems in no wise disturbed by the advent of cold weather, and advantage may be taken of any warm, bright days which may occur during the Winter, when the roads happen to be in good condition, for an occasional drive. During the long periods of the Winter when automobiling for pleasure is obviously out of the question, such vehicles may be jacked clear of the floor in order to relieve the tires and a cover thrown over them, but still it is but a matter of a few moments to "get away" for a ride during a favorable spell of weather.

The cities and large towns of the country are now so well supplied with garages that are kept well heated during the entire Winter season, that the great majority of users can find warm quarters for their machines, if they so desire. Nor are the rates usually charged for "dead" storage during the Winter by any means exorbitant. Sometimes arrangements can be made with the proprietors of small garages, who are anxious to secure custom, to store the machine, with the privilege of occasional use during the cold season, at a figure very little, if any, in excess of that charged for "dead" storage. The gasoline and oils sold and the repairs required are very welcome additions to the business of these concerns during the dull season. Automobilists in the larger cities who wish to run their cars, from time to time, during the cold season can usually be accommodated at garages at figures considerably lower than those charged for the same service during the Summer.

The user who has no heated stable, who does not care to incur the expense of garage storage and who has decided to entirely dispense with the services of his car during the cold season, will naturally place his machine in his own or a neighboring stable and will aim to leave it in such condition that it shall suffer a minimum of deterioration from disuse, cold and other destructive influences.

The most important precaution to be taken with water cooled gasoline cars and with steamers, is the complete drawing off of all water which the machine contains whether in tanks, radiators or piping. Gasoline cars are always supplied with a draw-off cock, supposed to be situated at the lowest point of the system and generally located in the bottom of the radiator or at the lowest point of the engine jacket, and sometimes more than one outlet is provided. These cocks, when opened, are supposed to allow the cooling system to empty itself completely, but occasionally there are bends or dips in the connecting piping which retain some of the liquid. Wherever there is a suspicion that such a dip exists, it is well to disconnect the piping and allow any water contained therein to escape. The piping to the pump may also be disconnected and the engine cranked briskly, a few times, in order to throw out any liquid which the pump may contain. When all water has apparently flowed out of the system, it is well to "joggle" the car forcibly both sidewise and back and forth in order to expel any remaining portions of the liquid. The filling plug of the tank or radiator may well be left removed and the disconnected piping not replaced, and it is very advisable to perform the "drawing off" operation when the car is warm from actual operation.

If the car be a steamer, it is well to empty it of water when hot, by blowing out the boiler through the usual "blow off" and leaving it with gage cocks or throttle and blow off cocks open. The engine may be freed of condensed water by jacking up a rear wheel and turning it over by hand until it is certain that it contains no liquid and it may, if desired, be flushed internally with kerosene or some other oil by removing the lubricator and supplying the liquid to the aperture, at the same time turning the engine over. It goes without saying that the water supply tank should be completely emptied, but it is a matter of considerable difficulty to assure oneself that all the piping of the machine is perfectly freed. Some steamers have a feed water heating coil contained in the exhaust muffler, and this is very difficult to free of water except by forcing air pressure through it.

Some disconnection of the piping of the boiler supply system will usually be found necessary, in order to drain the cylinders of the pumps and the pipes themselves. Joggling of the machine will be found useful in causing the discharge of small amounts of water which might otherwise remain, and, after the piping is disconnected, the pumps should be worked to fully clear them.

In order to remove all possible danger from fire, the gasoline tank of any car may as well be completely drawn off through the drain cock which is usually provided for the purpose. This will wash out most of the sediment which may have accumulated during the season's running, and leave the tank in good condition for next year's supply. The plug may also be withdrawn from the bottom of the carburetor float chamber and the whole system thus emptied of gasoline.

Some users of gasoline engines inject a quantity of kerosene into the cylinders of their engines and into the valve and combustion chambers and crank the motor over until the oil has worked well through the moving parts. This treatment tends to remove carbon deposits and hardened oil residues and leaves the parts in a generally clean condition. If thoroughly done, the engine will not stick when very cold weather comes on and may be cranked over occasionally when the owner happens to think of it.

There is no special advantage to be gained by removing the oil from cups and lubricators, as the lubricant, although solidified by cold, does not produce bursting pressures, as does water, nor, so far as I know, is mineral lubricating oil deteriorated by the action of low temperatures. Some sight feed mechanical lubricators, however, employ water in their feed glasses and this, it is needless to say, should be carefully drawn off, according to directions usually furnished with these oilers. It must not be forgotten, also, that acetylene lamps contain water reservoirs, and that these should be completely emptied, if the lamps are to be subjected to freezing temperatures, and perhaps may be advantageously drawn off in any event if the lamps are not to be used for some time.

If one wishes to start upon the new season with clean chains, these articles may be removed from the machine and placed, during the Winter, in a bath of kerosene, from which they will emerge in the Spring in a much improved condition of cleanliness.

Perhaps the most important subject of precaution, when putting away the machine for the Winter, is that of the tires. In order to remove them of all strain during their period of inactivity, the machine should be jacked clear of the floor a distance of two or three inches and supported upon wooden horses. The four points of support should be the axles, nearly under the springs, and the horses or other supports should not be so placed as to prevent the wheels or any other operating part of the car from being turned. If no suitable horses are to be had, wooden blocking will suffice, provided it is secure, with no likelihood of toppling over in case the machine is handled.

The air may be allowed to escape from the tires, and any oil which may have collected upon them should be wiped off and their surfaces given a layer of French chalk or talc powder. Some owners detach their tires from the rims and remove them to some dimly-lighted room of nearly uniform temperature, where they will not be subjected to the destructive influences of bright sunshine and extreme temperature changes. The casings are sometimes wound with canvas or burlap and laid flat upon the floor, and the inner tubes, deflated, rubbed with talc powder and laid flatly so that they may not become creased. The place in which they are stored should not be damp.

Whether or not all this labor is warranted by the results, is highly problematical, but it is probably good judgment to apply these precautions to new tires which are held in stock.

It is important that the body and other painted and varnished portions of the car should be washed perfectly clean of mud and well dried before being placed in Winter quarters, as, if the mud is allowed to remain through the cold season, it cannot be removed without leaving permanent marks upon the varnished surfaces. Some owners make a practice of having their cars revarnished during the late Fall and hauled from the paint shop to their Winter quarters. This allows a long period for the drying of the varnish before the season opens.

Removable, bright portions of the car, such as lamps and horns, may be taken off and placed in the house, if desired, and cushions, hampers and mats may be accorded the same treatment, especially if the storage room in which the machine is left be damp or permeated by ammoniacal gases or vapors from the "hay motor" department.

The bright, exposed portions of the car which cannot readily be removed, such as operating levers and the metal work on the dash and hood, may be given a light but complete coat of vaseline to protect them from corrosion, and vaseline may also be used upon bright portions of the engine, speed changing gear and transmission as an antidote against rust. The valve operating mechanism and the ignition apparatus of contact sparked engines, operating rods which are not painted, the drums of brakes and speed gears, copper engine jackets, metal circulating and intake pipes and, in fact, everything which is intended to be kept bright, may well share in this treatment.

When all has been made "snug" a cotton cover or one of enamel cloth should be thrown over the whole machine, and one may feel that all reasonable care has been taken to insure a minimum of deterioration

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In a recent report of United States Consul Day, at Bradford, England, automobiles are mentioned as one of the "most important" of the products of the United States *which are imported in that locality.*

AN EXAMPLE OF THE LIMOUSINE.

Style In Closed Bodies.

By N. B. Pope.

The general trend of development in automobile design is a merging into standard types. Certain forms are being adapted and retained because they pass the test of service, or because they strike the popular fancy.

Apparently the most satisfactory arrangement of the mechanical parts is that used quite universally in the large touring cars, in which the engine is placed under a bonnet, and all mechanism except that of control is either in front of the dash or suspended from the running gear below the body line. Thus the essential elements being entirely contained in the chassis, the body is quite independent, and may be constructed to serve any desired purpose, or fashioned to suit any taste.

In order to insure the sale of any year's product it must have such marked characteristics distinguishing it from the output of all other seasons that it will create and stimulate a demand for itself in preference to the old. In the earlier years of the trade this demand was made more pressing by the necessity of improvement in the vital parts, but developments along purely mechanical lines are yearly becoming less striking to all but the engineer and the mechanic. The changes are more in constructive detail—unintelligible to many buyers—in the removal of superfluous parts, and in refining those that are necessary, than in any radical alteration in the principal elements. The demand for marked change from season to season is, however, still as strong as ever, and the natural outcome is the establishment of certain styles in body and finish which change annually, and which are becoming more assertive each year. Thus the typical 1902-03 car was equipped with a King of Belgium tonneau body, while the product of the past season has been almost universally of the side-entrance phaeton of surrey form. Yet the salient features of the chassis have remained unchanged.

The element of style, pure and simple, is, of course, a more noticeable and important consideration in the larger machines than in those of the runabout order, because the low price of the latter does not permit the use of any but the simplest and most inexpensive forms. They usually, however, copy in outline the shapes of the more expensive cars. The purchaser has no option on the style of body. In the higher-priced machines, on the other hand, the purchaser of a new car almost invariably has the choice of two different forms, and may, if he wishes, have a body built to order, there being no limit to his possible outlay for elegant trimming and elaborate accessories.

For general touring purposes during the cold and uncertain fall and spring weather, and for running about town during the winter months, the closed body is especially useful. In theory, this form is a development of the canopy top, but as all automobile design is more or less closely related to carriage design, many closed bodies are mere adaptations of the forms of horse-drawn vehicles. The canopy top, with storm curtains, naturally gives way to a similar top with glass panels—the elementary form of closed body. The process of development and refinement changes this to a heavier top, very much like the canopy, but shaped and finished somewhat more elaborately. This form, in turn, gives way to the permanent limousine.

The changes of style in closed bodies are naturally affected greatly by the prevailing forms of open body. The matter of entrance from side, rear, or front, for instance, has been worked out in both types, the open body always taking the lead.

There are arguments in favor of both side and rear entrances, but the most used just now, and probably the most satisfactory, all things considered, is the former. It is comparatively simple to construct, con-

venient to use, and permits of a following out of the general rules of carriage design in form and ornamentation.

In the workmanship and finish of the limousine, the coach builders' art is being directly applied to the automobile. The shapes are analagous, if not copied directly, decorations by moulding, panel and stripe are similar, and the interior finish is but a further development of the craft. This is of particular advantage, since it relieves the maker of the labor of studying the structural design, for he is already familiar with it in principle, if not from practice, in the older trade, and gives him leisure to consider the figure and detail best adapted to the horseless vehicle.

The chief desideratum in present body design is to secure adaptability to a variety of uses. As the average motorist owns but a single car, this must serve at once as runabout, touring car, carryall and brougham. The owner may be forced to make his one machine, with a single body, serve these various uses, or he may have more than one body for the same chassis, or some form of convertible body.

The furnishing of the closed body may be as elaborate as the owner desires. The newest limousines are particularly elegant. The finest of imported cloths are used in the upholstering, the appointments complete to the last detail, and the refinement goes on to a point of ultra development in the so-called Pullman body, which is finished in natural mahogany and equipped after the manner of a private railway coach.

Taking up the different types of closed bodies now in use, somewhat in detail, we have, first of all, the closed canopy. It will be noticed that the lines of the open tonneau are but little changed; the top is readily detachable, and the glass panels are all removable. It is thus possible to have the partial protection from wind and dust afforded by the front and rear windows while having the side open, or to close the whole tonneau for use in cold and stormy weather.

The limousine proper is made up in a variety of different shapes, and either in detachable or permanent form. If detachable, the body is called demountable, when the line of separation is below the rear seats; while if the top is set over the car in the manner of a canopy, it is known as a balloon top. In the one case the car has a more satisfactory appearance, may be more comfortably furnished, and is more subject to external decoration than in the other, which shows its convertibility at all times, and is in many cases rather crudely marked out. The permanent limousine, though retaining the air of the horse-drawn brougham or coupe, is made up with a substantiality and general air of completeness which brings the body maker fully apace with the chassis builder.

A form which is convertible at will from open to closed, and comfortable in either capacity, and is now coming into general use, is the landaulette. The top, when closed, gives ample protection from all weathers, and when folded back serves as an efficient dust shield, while the glass front is always an acceptable screen from wind and dust. In many respects it is preferable to all other forms.

The future development of automobile body design is quite beyond conjecture, but the canopy top is likely to be a permanent type because of its inexpensive construction, the case with which it may be detached, and the possibility of closing it in to any desired degree from one extreme to the other.

Out-of-town subscribers of The Horseless Age, who intend visiting the New York Automobile Show, are requested to communicate with the Editor, if possible mentioning the name of the hotel at which they will stop when in the city.

A Pullman Body.

TOURING ROUTES

A Night With Raccoon.

J. R. Kingsley, M.D.

What vocation is there which of itself contains the elements of recreation to a sufficient degree to satisfy one in not seeking further ends for gratification? Some callings, of course, come nearer meeting this want than others. The profession of medicine and surgery, while covering a broad field, presents many opportunities of pleasure—happy young and old bestow encomiums upon the physician for restoration to health, and at the demise epitaphs galore of his kindnes and ability. He also has vividly impressed upon his mind many displeasures—the wrath of the disgruntled, after long and wearied trips, and cases of the most ghastly accidents, or appalling wretchedness of want and penury. After having to meet and face the pleasures and displeasures of his profession day and night, can you think it curious if he should seek a rare and unique method of attaining a few hours of extremely delightful recreation, even if it involves nightly automobile excursions into the secluded depths of our forests, along streams, over bog and moor?

Sundown approaches and conditions bid fair to make an ideal night for a coon hunt. One hustles and bustles about to get the automobile in fine running order and well provisioned for a trip into the country from two to twenty-five miles. One has only to go with an automobile once, enjoying the rythmical chug-chug and the swift, steady passage through the crisp autumn air, to become convinced of its superiority over the horse as a means of conveyance.

One needs to be warmly clad, wear high-top rubber or leather hunting boots, carry a good substantial lunch, and two or three bottles of some drink (I prefer some carbonated water), and take along one or more trained coon hounds—the more the merrier the chase, providing they know what is wanted of them, but if not, the fewer dogs the better. The rest of the outfit required includes a pair of steel climbers, a 22 long rifle, a revolver and ammunition, a hunting knife, 4 ounces of carbon di-sulphide, 30 feet of ⅜-inch rope, a hunter's hatchet, a mason's line and snap, an acetylene bicycle headlight, lanterns and roman candles. Thus outfitted, one has only to go to the haunts, feeding and watering places of coon to have an evening of unlimited sport.

Some details concerning the raccoon's life, habits and methods of self-protection may be interesting, as well as the methods by which he is usually captured, and some

SCENE ON THE SHEBOYGAN.

choice bits of scenery by the wayside and machine experience.

The raccoon (waschbar) belongs to the bear family, his small form shows it, and his habits and actions more than confirm their relations. The raccoon is more numerous and widely scattered than any other game animal, except the rabbit and squirrel. He is found only on the American Continent. Still, you ask the farmer if he ever sees or hears coon near his place, and he replies: "Rarely, but think there are a few in the woods." When he finds you have killed a score or more near his place, he will marvel.

The flesh of the raccoon, properly cooked, makes a delicious dish. The pelts are becoming more valuable yearly for garment making. What is more delightful than to slip into a coat as shown in the cut herewith on a cold winter's day, when the biting winds strike through your heavy chinchillas, Irish frieze, and beaver coats, chilling to the very marrow, and find the fur coat turns the blasts aside? Furriers dye the prime tanned pelts and make them up as ladies' furs; and they are sold on the market as genuine stone martin and under various other names, but never as raccoon. The raccoon, as a game animal, is protected in only one State, namely, New Hampshire. "There coon hunting and training of coon hounds has been reduced to a science." I think above statement might well be questioned by other sections of our country, especially by some sections of the south and southwest. It is a mistake that the raccoon is not protected in other States at all seasons of the year, except from September 15th to January 1st.

NEAR THE HOWARD ROAD.

The raccoon is a carnivora as well as herbivora. He enjoys his fowl, field mouse, clam, lobster, crab, worm, honey bee, yellow jacket, clover, carrot, turnip, apple, corn and beech nuts to an epicure's and gormand's satisfaction.

It is said that as a fisher he uses his tail to catch clams, crabs and lobsters. Whether this be true or not, we know he gets them in some way. He is a trifle more domestic than some specie of bear; but the black and brown bears also enjoy developed country, but possibly the bear has more reasons for leaving developed country for protection than the raccoon.

The raccoon, in life and habits, must be classed as one of the cutest and shrewdest of small animals. He varies in weight from offspring in September at 5 pounds to 12 pounds, to the old male at hibernating sea-

son in December at 30 pounds to 52 pounds. His favorite home is the hollow tree; but he will seek shelter in stone piles and holes, it is said, where no forest is available. Hunters frequently shoot coons from trees during the day when they are enjoying a sunbath asleep on some suitable limb. They have been found approaching within one-half mile of the outskirts of cities from twenty to thirty thousand inhabitants; and if food is scarce, they come freely to your garden, orchard and poultry house on the farm; and our shepherd dogs have treed them in our front yard shade trees at night.

An old coon's track greatly resembles an infant's imprint on the sand or partly dried mud, and once seen will never be mistaken for another track. He leaves the coldest and poorest scented track of all animals; and I often wonder how old the track is when hounds give voice on it. Hounds get a good trail going, and they may not get Mr. Coon without much difficult work; and if an old one, which has been treed and shaken out, he is liable to give dogs battle on ground or in water rather than tree. They will seek water and sit on a rock in midstream, nearly or quite immersed, while dogs give up in despair. Dogs once brought an old male at bay on the upturned roots and earth of a fallen tree, and on being pressed by dogs the coon leaped into the pool of water at the base of the roots, and there remained immersed with only the nose projecting above water. I found him with my lantern and struck him across the nose with my billy club; the dog grabbed him, but could not loosen him from his refuge, because the coon had caught his claws on the roots. They delight in going up trees overhanging a deep stream or lake, and an old coon in two or three feet of water will tire out or kill the best hound living. They seek the rail fences, run along under or over stump fences or stone fences, swim up or down a stream, out into or across a pond or lake, run up a small tree and jump out, landing twenty or thirty feet away (in one case eight successive times before finally treed), or across a limb into a larger tree, and then down and take old tracks back. If an old female with her young ones is found, the young ones will often tree, one at a time, and the rest go on until we finally overtake and tree the old one, perhaps three miles from where we started them. This is a favorite trick, and often very effective in saving the young ones,

Scene on the Sheboygan, Sheboygan Falls Road.

Scene on the Pigeon from Manitowie Road.

and many times giving the old female a chance to escape. The dogs bark at a tree, and if not close by you do not find it, for in circling a tree, as a good dog always does, he finds tracks going on, and leaves the tree; and if you get the coon, you must go back later and take their tracks when they come down after you have gone by and left them unnoticed. We often do this. When dogs are killing a coon, and it squeals or cries, and others are in the trees, they seem to get frightened and leap out and scamper away—meaning another chase if you want to get them. An old coon will fight you if cornered in a tree or on ground. A coon rarely goes into a hole in a tree unless in autumn or early in the morning, and then you must anaesthize with carbon disulphide and cause him to drop to the bottom of the hole and chop him out or twist him out with a crotched stick. Fire crackers are no good then, for the dogs have chased them there, and they are frightened. If you climb a tree and drop a bunch of lighted fire crackers into the hole, and there happens to be a coon or coons in there, they will come out in a hurry; but never if driven there by dogs. I believe the old male coon is more daring than the female and young ones. The largest male coons I ever knew of being killed, were killed by hunters in the early morning or forenoon; and often travelers report seeing a big coon cross the track ahead of them during the day.

A few words must be said about the dogs. No dogs, usually, no coon; but to get coon and have the full enjoyment of the chase, the dogs must possess characteristics and qualities not developed in the ordinary hound in all localities. A good, well-trained coon hound is a rarity. An ideal coon hound should measure up thus: Well muscled, sound, not too old, ambitious, good ranger and scouter, true to coon track (no cat, rabbit, mink, fox or skunk trail should arrest his attention enough to elicit a bark), good voice on trail, a true dog at tree (when sure his coon is there), good barker at tree, good fighter, never taking back trail, never bark over worked ground unless there is a new scent, and should report once in 15 or 30 minutes. If one possesses such a dog, loves coon hunting and is able to enjoy it with dog, $100 could not buy that dog. What other sport can I get as much genuine pleasure out of? I have never found it yet; and there are others who look forward to the autumn season as I. Is it for the pelts and flesh? No! Take the novice out and say nothing to him; and when the hounds get into the real heat of the chase, nine times out of ten he will exclaim: "I'll stay all night with this." Never took the man out yet who did not want his second trip.

My conveyance needs some praise—my trusty runabout—in daily use in my practice since June 28th, 1904, through thick and thin, rain or shine. I have not had my *troubles yet, I suppose.* An exploded inner tube, due to my having pumped tire to hard on a hot sultry day, and a heavy load; and a sprung front axle due to taking a bad culvert at too high a speed have been my only mishaps so far. I am very careful to keep the machine adjusted, looked over, and provisioned; and with due care I expect to always get back without help, as I have at all times thus far.

I believe the most trouble with the standard makes of automobiles to-day is due to negligence or lack of knowledge of your car.

To take John, a faithful companion, Red, Rattler and myself, and spin out to neighboring forests from two to twenty-five miles an hour, over our Sheeboygan Falls and Town Line road, past some of the pretty niches and grottoes of scenery here depicted, enervates and sends the ozone of the country air through your system as nothing else can do, and gives you an appetite for Boston baked beans and cucumber pickles. One can go at his work the following day, usually, with renewed vigor and pleasant thoughts about the past night, unless a fate befall him as did a neighboring hunter a short time ago. He took his machine, two companions, and dogs, and went to the woods, leaving his machine in nearly the same place as I did a few nights before. On returning to the machine at 2 A. M. he found the tires deflated, caps gone, pumps and an extra gun and pair of climbers stolen. Some grieving farmer lads were seeking retribution for some of their lost coon, possibly. A despicable trick, but nothing more than can be expected from those who lack the honor of men. The bicycle has been treated thus many times by vandals.

The main roads of Sheboygan and neighboring counties are well gravelled, and present at most times, especially in the autumn, a fine surface for automobile travel. Among these roads the old Sheboygan, Fond du Lac, Milwaukee, Green Bay, Calumet Plank, Howards, Sheboygan Falls, Town Line, and Dye, Sauk Trail, Lake Shore, Manitowoc and Union roads are exceptionally fine. The rural sections have made more improvements on the highways of our county the past year, than in the preceding five years put together, which is accounted for by the establishment of rural mail delivery routes. The above roads pass through a rich farming country, where dairying is the main industry. The undulating and well husbanded farm lands along the Sheboygan, Pugeon, Onion and Mullet rivers, present some choice bits of scenery, of which two or three are herein shown. The general landscape views of our county are unsurpassed, except by mountain scenery. One touring up the west shore of Lake Michigan will find that Sheboygan County stands foremost with her sisters in roads, manufacture, and dairy farming. Few counties in the Union, of equal population, show greater rural bank deposits than ours.

In closing, will say that if any reader should think that raccoon hunting with an automobile is as easy as the Wall Street broker's hunting on his 60,000 acre preserve in the Adirondacks, as depicted in "Life," he will be sorely mistaken, and possibly make one journey and abandon it forever.

Scene on the Pigeon, Calumet Road.

A NIGHT WITH RACCOON-JOHN, RED, RATTLER AND MYSELF. THE RESULT OF THE FIRST NIGHT'S SPORT.

An October Automobile Trip.

By W. O. A.

From a town near Worcester, Mass., we recently took an outing by auto through the Berkshire hills to New York City and return. Thinking some of your readers might be interested enough to hear of the trip in detail, I submit it as fully as possible from the brief notes I took.

At 9.30 we waved au revoir to the folks at home and rolled out of town. It was a glorious Fall morning, although the weather had not been very frosty. Nature had begun to turn the Autumn leaves, and in the valleys could be seen scattered maples that had responded to her sovereign brush and glowed in brilliant Autumn colors.

A change soon came, but not in the scenery. As we were entering a nearby town we espied a butcher's cart standing in the road facing us. In our section the horses, as a rule, are not much afraid, but this one showed unmistakable signs of terror. We knew what it meant when we saw him raise his head and look askance at us. So we slowed down and blew the horn, but there was no butcher in sight. We ran along slowly a little further and blew again, and finally stopped. Just as the butcher heard us, the horse had evidently heard enough of us too, for he proceeded to turn around in the road and tip the cart over, the butcher standing and viewing with dismay the remains of the broken cart and scattered load.

After we had helped him right his wagon and he had taken our number, which in his confusion he was determined to put down backwards, we went on through the town, headed for Oxford, over roads that were not in the best of condition. We had hardly gone two miles when, as we swept around a long curve in the road, we had a hearty laugh at the expense of an aged man we came upon rather unexpectedly, driving a venerable white horse with a load of vegetables.

On arriving at Oxford I noticed something wrong with the brake, and upon investigating found the spider on the left axle broken. I tied the shoe up to stop the rattle, and went along intending to have it fixed at the first convenient place. We passed through Charlton Centre, arriving at 11.20 at the Overlook Hotel, where we stopped for lunch.

At 1 o'clock we started for Palmer, the roads still being rather bad. We passed through Sturbridge, Fiskdale and Brimfield, the roads improving as we neared Palmer, where we arrived at about 3 o'clock and had our gasolene tank filled at a wholesale oil store. Here a party from New Jersey, who were to accompany us on the trip through the Berkshires, met us and after our friends had donned their auto suits, we started via Three Rivers for Amherst, the roads being very poor and narrow, in fact, not much better than cart tracks. Arriving at Amherst without mishap, we stopped and took tea with friends, and at 9.20 started for Northampton, in a slight rain but over a good macadam road most of the way.

A BRAKE REPAIR.

We arrived at Northampton at about 10 o'clock, where we lodged at the Norwood Hotel. Next morning, as it was still raining, I took the opportunity to have the brake fixed. So I ran over to the local repair station, and found a good machine shop as well as a competent mechanic. I showed him my trouble, a broken brake spider. He 'phoned into Springfield for a new one, but without avail, so that a temporary repair had to be made under my instructions. We ran a half-inch iron rod from the shoe (first bolting it there through an eye on the rod) forward to the ball joint on the reach rod. Here we anchored it to a plate that we drilled two holes in, passing the rod through one hole and the ball stud through the other, with nuts on either side. Our brake was then able to stand all the strain the half-inch rod would hold.

The rain had ceased, and filling with five gallons of gasolene, we were again ready to start. We passed through the famous Deerfield Valley, and along the base of the Sugar Loaf Mountain, into Greenfield, which we reached about one o'clock. Here I took the opportunity to look the machine over. In the back yard was another fellow having his troubles with a steam car. Everything being found in perfect condition, we started for Williamstown via Shelburne and Charlemont, stopping at the last-named place for gasolene at a grocery store, the proprietor of which had a small steam machine he took great pride in. I also drew out the cooling water and put in a fresh supply.

We were now approaching Mount Hoosic, and I knew it would be a hard pull to get over, I wanted water as cool as possible. We had encountered some pretty stiff hills, but none equal to those we were now compelled to negotiate on these mountain roads, so steep that in some places I found it necessary to let all my passengers walk, and without a load the water boiled in the radiator. Near the top of the mountain I saw a man gathering apples, who told me he had never seen such a large car make the top before.

From here on the view was superb, but as it was now rapidly growing dark we did not stop long to enjoy it. On the summit is about two miles of fairly level road, along which we met a two-horse team and workmen who had been engaged on the road. I pulled out to give them plenty of the road, which seemed nice and hard by lamp light, although somewhat crowning, but the crown proved to be of slippery wet clay and the rear wheels skidded into the gutter, spinning around like tops.

AT LAST WE WERE STUCK!

The ladies were not slow in getting out, fearing a capsize. The driver of the team offered to pull us out, but he had no chains or rope, nor did we, as this was our first tour, and in our confidence we had overlooked the rope tackle, which should be carried by all tourists. Finally one of the party put some brush in front of the wheels, and we worked this under them until we had a slight foundation and managed to get out. After thanking the generous teamsters for their helping hand, we were again off. The ride down the mountain was a rather nervous one for the ladies. The road was dark as ink and unfamiliar, and the steep pitches and sharp curves were very exciting. As we were sweeping around one of these curves, we came head onto a pair of grey horses hitched to a canopy top buggy. The horses were terribly frightened and danced around so that they broke the harness. I

had all I could do to bring the car to a standstill, and after patching the harness up, we led the horse by. From where we now were, North Adams could be seen down in the valley far below us, the electric lights looking like so many stars. It took about 45 minutes to reach the valley. It was surely a ride to be remembered. One of the ladies made the remark that her toes were fairly tired trying to hold back on the hill. From North Adams to Williamstown we made quick time as the road was macadamized, and we pulled into Williamstown at about 8.30. Here we stopped at the Greylock Hotel, where we spent the next day. Looking the machine over, I found the chain was wearing out, and replaced two side links which had started to wear through at a loose rivet. Williamstown is a very beautiful old place, with wide streets well shaded and with the famous Greylock Mountain looking down upon it.

Sunday morning we again started at 10 o'clock via Hancock, Lebanon, Hoosatonic and Pittsfield, where we stopped for seven gallons of gasolene at the garage. Then we ran to Lenox for lunch, continuing on to Stockbridge, Great Barrington, Sheffield, Salisbury, Lakeville and Sharon. Here we lodged at the Sharon Inn, a very quaint old place. Everything about the machine had gone well, with the exception of the chain, which began to show wear after the mountain climb. Next morning, after filling at the apothecary's with four gallons of gasolene, we started at 8.30 via Amenia, Millbrook and Poughkeepsie for the Hudson River, which we crossed at Fishkill Landing, reaching Newburg. Here we had lunch at the hotel, and after filling with five gallons of gasolene, we started in the rain. I was pushing along rather hard to avoid the shower that I saw was coming up, trying to make Englewood, N. J., when I heard the chain making an unusual noise as though it were loose. We were speeding along at about a 25-mile pace on a very good road, when I thought I had risked that chain long enough, for I knew what might happen should it break at that speed. I stopped and tightened it up a little, and when I came to start again the car had hardly moved when snap went the chain! It was necessary to repair it where we were, so that it was 6.30 before we limped into Englewood.

We put the car up at the garage and wanted a new chain put on, but they had none. They advised that we go into New York City by train and get a new one. But we thought we would sleep on the matter and make up our minds in the morning. In the morning we made up our minds to try and make New York City with the old chain, which was completely "out of business." Parting company with our guests, as Englewood was their home, we made New York all right, crossing the Hudson again at Fort Lee ferry. We at once had a new chain put on at the headquarters of the makers of our car.

It looked so much like rain for the next day, that one of the ladies started for home by train. We put out next day, however, via Port Chester, Greenwich and Stamford. Here we had our first skid. On Main street we took a slide that turned us completely around, facing back in the same direction whence we came. Still, the ram continued, and on entering Bridgeport, we skidded again. We were in the car track, and I was pulling out to avoid an approaching car, when we suddenly slid, landing upon the sidewalk, high and dry, facing backward again. This sprung the rear axle a little and pinched a hole in a front tube, but the injuries were not serious enough to stop our journey. We did not know the tire was leaking until we were nearing New Haven, but we preferred to push on rather than stop and put in a new tube, as it was raining hard and very cold. We ran to the garage and had the tire repaired while we were at lunch. With six gallons more of gasolene, we left the Elm City and at six o'clock arrived at Hartford, where we lodged for the night. This was a hard run, on account of the rain and the bad condition of the roads. A good night's rest, however, put us in fine shape for the next day and, after filling with four gallons of gasolene, we started out via Windsor Locks, Springfield, Palmer and Warren. Here we lunched and again filled with five gallons of gasolene, and completed the remainder of the trip without accident.

From the very start I had kept a most careful watch of the engine, and it went through the whole outing without so much as a screw loosening or a skip. With the exception of the slight chain trouble and the rain, it was certainly as enjoyable a trip as anyone could ask for in a motor car.

Automobiles Imported for Touring Non-Assessable.

Assistant Secretary of the Treasury Armstrong, in a letter to Collector Stranahan, of the port of New York, dated November 21, ruled that it was not the intention of the department to assess penalties on cars imported in good faith for touring purposes.

The point was raised by the case of H. T. Kearney, a Californian, residing abroad, who had brought to this country for the purpose of touring, a car which he entered at £1,400, and gave a bond of $10,000 to guarantee its exportation within three months. The appraiser, however, put the value at £1,685, and held the car for the collection of a penalty of $2,000 for the alleged undervaluation. This advance in value was sustained by General Appraiser Fischer.

Mr. Kearney explained that he had entered the car at the price he paid for it, thinking that this was the correct proceeding. Assistant Secretary Armstrong, in accordance with the ruling given above, directed the collector to release the car.

LESSONS of THE ROAD

An Improvised Vibrator Spring.

By J. C. Cunningham.

My friend, the bank cashier, called for me in his little curved dash runabout to accompany him out in the country to see a sham battle. He had just had the thing (as he called it) thoroughly repaired—new bearings, new batteries, new plug, etc., put in—and he wanted to see how she ran.

Knowing that we could travel faster than the many teams that would be on the ground, we started late. We could not help remarking how beautifully the little rig ran on our way out. About the only place we could get a good position on our arrival on the grounds was on a long bridge at the end of a lane.

The battle had commenced when we arrived, and we climbed up on the bridge to view it. From appearances we were the last to arrive, and as we expected to be about the first to leave, we let the auto stand on the bridge, so as not to annoy the teams on the other side.

The battle being nearly over, the men and the teams began to show signs of getting ready to return, and we thought best to move off the bridge at least. My friend gave the crank a turn and the motor started. "See that?" he said, as we started to climb in, "if these things would only do that every time, there would be some pleasure in having them." He thought best to turn the cups on the new bearings and use the oil can, so stopping the motor, we removed the cushion and raised the lid, and he proceeded to oil up, but before he was through we had several teams waiting to pass us, or for us to precede them.

"Just wait," he said, "we will clear the track in a minute." Hastily throwing the oil hole cleaning wire in the tool box (as he thought) and placing the oil can in its place, he slammed the lid down and I adjusted the cushion on the seat, while he proceeded to crank, expecting the motor to start immediately. I took my place in the seat. "Something wrong," he said, as he pumped more gasoline to prime it. I put my foot on the compression lever to ease the compression, while he got out and used both hands to crank, but all to no avail. He switched on the extra set of batteries, but it was no use. People were calling out to hurry. He raised the lid in the rear to look at the plug. It was connected in good shape but the plug might be foul from too much oil, and we must take time to inspect it.

"Clear the track," everybory called, "the soldiers are coming." Looking across we saw some cavalry starting across from the opposite side. The machine was in the cen-

ter and he stopped unscrewing the plug to assist me to remove it to one side. An officer rode up and told us to move it off the bridge altogether.

We told him he had better move it off then. After some hot words, he ordered some of his men to assist in pushing it to one end of the bridge.

There was all kinds of confusion now. Many country people were spectators and their teams began to scare, and we were ordered away by them.

Some artillery now made its appearance and there was more confusion. Strong language was now of much avail and used on all sides, regardless of ladies near at hand.

After having delayed everybody, frightened teams and caused nearly a dozen fights, we were at last left alone. On looking at the plug, it seemed to be all right. "Try the batteries," he said. They were on my side and I raised the seat lid and looked at them, discovering that in our hurry to get started after oiling, my friend had thrown the cleaning wire in the battery box, on top of them, instead of the tool box and that caused trouble. Anyone familiar with this kind of car knows that the tool box is on one side under the seat cushion, and the box containing the eight batteries on the other.

We would have investigated the batteries at first, only that they were new and had been working two minutes before.

After telling this incident to a friend, he told an experience of his with the same style of car. He had owned the car but two weeks, and though he could manage it perfectly, knew very little about taking care of it. In fact, he said, that during the two weeks that he had owned the rig, he had no difficulty whatever, except spark plug troubles caused from using too much oil. On the occasion mentioned, he and a commission man had been out in the country buying wheat. They were gliding merrily along, the motor throbbing as perfectly and regularly as a clock, when all at once the throbs ceased and the auto stopped.

I will give his words as nearly as I can in describing his difficulty:

"The first thing that I looked at on getting out was the plug. It was the only thing that had ever bothered me, and I thought it must be foul, but found it clean as a whistle. I took a glance at the batteries; they were connected up all O. K. and would sing to a finish.

"Then I cranked awhile, but no go. I looked for gasoline and found plenty in the tank, and then cranked again, but no use. We took the carbureter to pieces (which was never made to take apart), and found it clean as far as we could judge. We were sure that gasoline could pass through it any way, to the pipe leading to the cylinder, so after putting it together my friend took his turn and cranked and cranked, but never a shot.

"We then looked up the instruction book and both got in the shade of the rig and started to read it. We each weigh over two hundred, you know, and it crowded us for shade, but like two little boys reading out of the same school book, we put our heads together and looked for what we thought caused our stop. We read that 'if the batteries appear all right, the plug clean and the buzzer buzzes, to look for valve trouble.'

"When we saw this we felt sure we had found the bug, so we crawled out from under our shady place to investigate. We expected to find the valves broken or stuck tight and fast, but all appeared to be in good shape. We were twenty-three miles from home, and by the nearest road about ten miles from any town; and being late in the afternoon, we began to think of getting home somehow, or finding a place for a night's lodging. Two light teams had passed us when we first stopped and asked if we needed a tow, but we told them there was nothing wrong we only stopped to oil. Now, we would only be too glad to have a team pass, and we looked anxiously down the road many times, but all in vain.

"We again read our book, and at last discovered that as yet we had not tried to find if the plug would spark. We thought it was useless to try, for batteries and buzzer were apparently all right, and it would certainly work. We tried it and were rewarded by finding there was no spark. We put in a new plug, but still there was none.

"We then went over the whole thing again and found both sets of batteries working fine, and the buzzer apparently doing its duty as well as usual. We now thought for the first time of looking for trouble on the line between the batteries and plug. We investigated the insulated cable, but found nothing wrong. We then looked at the commutator block and spring, and there was the mischief. The spring was broken where the little cam strikes, or at the nearest bend to the hole in the end where it fastens to the block. (There is a bend in the spring made by three turns.)

"Now, we thought the only thing to do was to foot it to some farm, hire a team and go home. First, we took the remaining part of the spring off the block and started. A few feet back we ran across the other broken part lying in the road. We picked it up and thought what a simple little thing could cause so much trouble.

"'If we only had a woman's corset steel,' my friend said as we meandered on our way toward a farm house a few miles back. 'What would you do with it if you had one?' I said; 'we have nothing to punch or drill a hole in it.' 'Well,' said my friend, 'the lower and upper end of some corset steels have holes in them just about the size of that in the spring, if I remember correctly.' 'Well,' I said, 'the first woman we meet, let us buy her corset.' 'We will never be lucky enough,' said the commission man, 'to run across one now, and any way, would you feel like stopping a woman on the road and asking her for her corset? Why, they would think we were two escaped inmates of the incurable ward of bug house.'

"When about two miles from the auto, we saw a team coming behind us. We both strained our eyes to see if a woman was in it, but as it approached we became satisfied there was none. When the team caught up with us it proved to be a Chinese fruit peddler. His wagon was full of empty boxes, he having sold out, and he offered us a place to ride after asking us if that was our wagon broken down in the load (meaning road).

"About the first thing we asked him after taking seats on the empty boxes was if there were any women at the next house. Being answered in the affirmative, we talked over the possibility of getting a corset steel and attempting to take the rig home. We induced the Chinaman to stop while we made the inquiry. The commission man stayed with him, to be sure he would not leave us, in case we had to go on, while I went to look for a woman.

"In front of the house I ran across a comely dame of uncertain age, watering flowers. She smiled very blandly on me when I told her my errand, and said she would see if she could do anything for me. On entering the house and explaining her errand, there was more or less giggling between herself and others of her sex. When she returned, however, she had two corsets that appeared to have seen better days. She said they belonged to the cook. She also pointed out the shop, saying that I might find something there that would be useful. (There is no farm or even cattle ranch in California that does not have some kind of shop with forge, vise, etc.)

"It did not take me long to take out several of the steel stays of the corset from which I chose the best. None, however, had a hole in them, but by driving one of the snap buttons, that are riveted to the steel, through with a nail, I soon had a spring made. The hole looked hardly large enough, so I took time to ream it out with a reamer that was among the tools. It was soft steel and easy to work. I thought at first it would not have spring enough, but it answered the purpose sufficiently well to take us home.

"We paid the Chinaman two dollars to take us back to the auto, and did not let him leave until we were sure that the spring would work. I had so much bend in it that it gave too early a spark at first, and caused a back kick on cranking, but we soon discovered a little arrangement on the sparking device for regulating just such things, and we were soon gliding on our way home."

New Vehicles and Parts

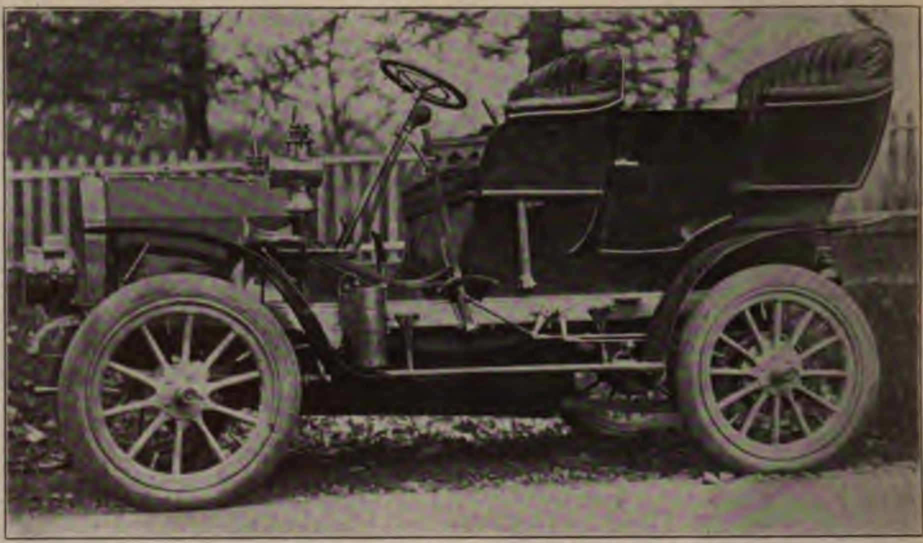
The Columbia Light Gasoline Surrey.

The Electric Vehicle Company of Hartford, Conn., will market two styles of gasolene cars the coming season, to be known as Mark XLIV and Mark XLV, respectively.

Mark XLIV, classed as a light surrey, and rated at 15-17 horse-power, is a type of the light weight, low priced, touring so much in evidence just now. It is built along accepted lines, with the Mercedes type of radiator and bonnet, and has a roomy side-entrance body.

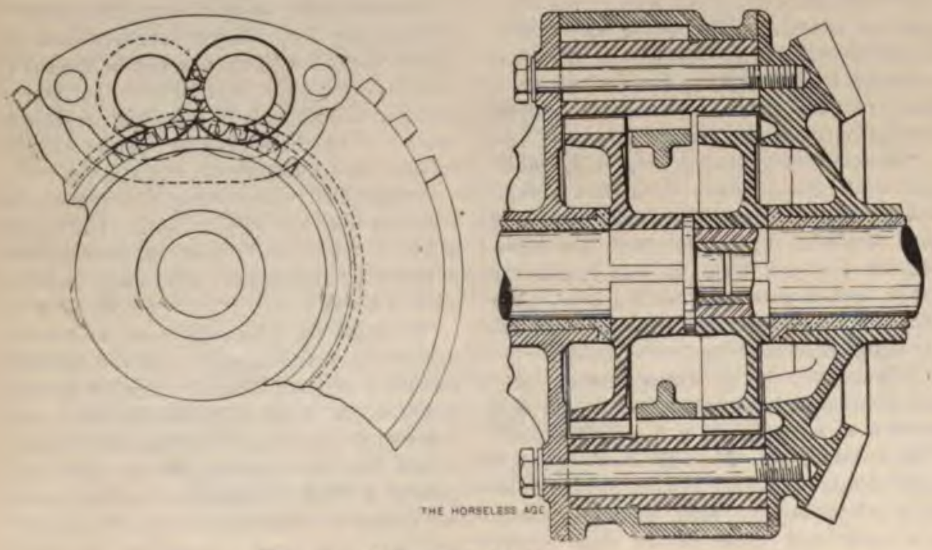
The frame is of pressed steel, channel section, is trussed at the center, and reinforced at the corners with riveted gussets. It is suspended on 40x2-inch semi-eliptical springs, in front and by a full platform in the rear. These springs are 2 inches wide; the cross member is 33 inches in length, while the two longitudinal members are 36 inches long. The platform is shackled, while the front is hung by a slotted joint to the spring hanger. Both axles are of tubular construction and are trussed to prevent warping. The wheels are of the artillery pattern and are equipped with 30x3½-inch detachable tires. The wheel-base is 81½ inches. The drive is by the line rear axle, the construction of which will be described later.

The braking equipment consists of a pair of internal expansion rings, applied by a lever with ratchet pawl and segment, and a pair of band brakes by a pedal. Both sets of brakes act on a pair of cast iron drums of trussed structure, which are bolted to the driving wheels. The rear axle is mounted on four sets of roller bearings. Plain bearings at the ends support the principle load due to the weight of the car, while the thrust of the bevel driving gears is taken by a pair of Timpkin's Roller Bearings placed one on either side of the differential. A torsion rod is bolted to the under side of the differential bearing and is connected by a short link with a cross member of the frame, which also supports the rear end of the gear casing. This steadies the differential and secures its angular alignment with the rest of the driving mechanism. The upper part of the housing is constructed so that it may be taken off by the removal of a few cap screws without taking down the axle, thus giving free access to the gears without dissembling them.



Electric Vehicle Co's. Mark XLIV Surrey.

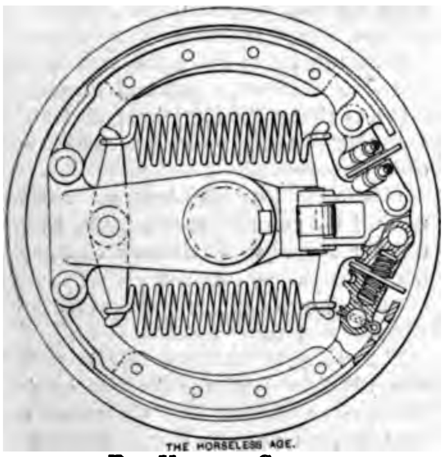
The differential itself is of the spur-gear type and runs in an oil bath. There are but two pairs of pinions, each pair meshed together and with each of the individual driving gears. The pinion hangings are supported and serve as distance blocks between the face of the driving bevel gear and a member which forms the other side of the differential. This member consists of a long collar bushed to receive the driving axle, and having two projections diametrically opposite one another, shaped to receive the pinion housings. Radial ribs serve as strengtheners. The framework is held together by four stud bolts passing through the pinions, and by four supplementary bolts, one in either end of each of the housings. The pinions instead of running on the stud which pass through them, are drilled to give a good deal of clearance and are designed to run free of them altogether. Their only bearing is on the face of the teeth which run in the housings. The object of this design is to give a rigid structure with a maximum of interchangeability.



Electric Vehicle Co's. Differential.

The engine is of the double opposed type with a bore and stroke of 4¼ by 5 inches. The rating is 15-17 horse-power on the brake. It is somewhat inclined in the frame so that under normal deflection of the springs the driving mechanism will be in direct line from crank-shaft to bevel gear, and the cordan joints will thus be relieved of work under ordinary circumstances. The cylinders are cast alike and form the crank-case and frame, uniting along the center line; each casting being one-half of the unit. The valve-chambers are side by side on the top of the cylinders, and both valves are mechanically operated and are interchangeable. The pistons are fitted with three concentric rings having bevel joints. The wrist-pins, instead of being fast in the pistons are secured to the connecting-rods and rotate in the piston bearings. The connecting rods are heavily bushed, the caps being held in place by four bolts. The governor, which is of the fly-ball type, is so constructed that its effort is transmitted to the regulating valve by means of a push-rod, the valve arm being held against it by a spring. By this means, acceleration by the operator brings no strain on the governor mechanism and thereby reduces the wear on its parts.

The ignition of the gases is by means of the jump spark system, the primary source of current being a battery of twenty-five small dry cells, connected in series—multiple of 5 and 5. The low-tension distribution is by means of a commutator attached to the half-time shaft, the angular position



End View of Clutch.

of which may be varied by means of a lever on the steering-wheel to regulate the time of ignition. Separate vibrator coils are mounted on the dashboard.

The lubrication of the engine is partly automatic. A pressurefeed oiler is located over the crank-case and forms its top. Its pressure is derived from the motion of the pistons, and hence the oil feed is proportional to the speed of the engine. An automatic pressure relief shuts off the oil feed as soon as the engine stops, thus preventing flooding. The crank-shaft bearings are fed by grease from cups mounted on the front side of the dashboard. Each of the outboard bearings is greased in two places. One feed is at the outer end, and the others, at the inner and, close to the crank-shaft. An annular groove is cut in the crank, close to the bearing, and connecting with it is a passage which leads directly to the crank-pin. The lubricant is forced into the ring and base of the crank by the pressure of the feed, and from there it is fed to the pin bearing by centrifugal action.

The cooling water is run through a Whitlock cellular radiator behind which is a belt-driven fan. The circulating system is all metallic. The pump is geared directly to the crank-shaft, and is of liberal size.

The engine is connected with the mechanism of transmission by means of a universal joint identically the same as is used in the driving shaft. A small amount of end play is allowed between the universal member and the two yokes which embrace it, so that in case the two shafts get out of alignment, it may "float," and thus serving the purpose of an Oldham coupling.

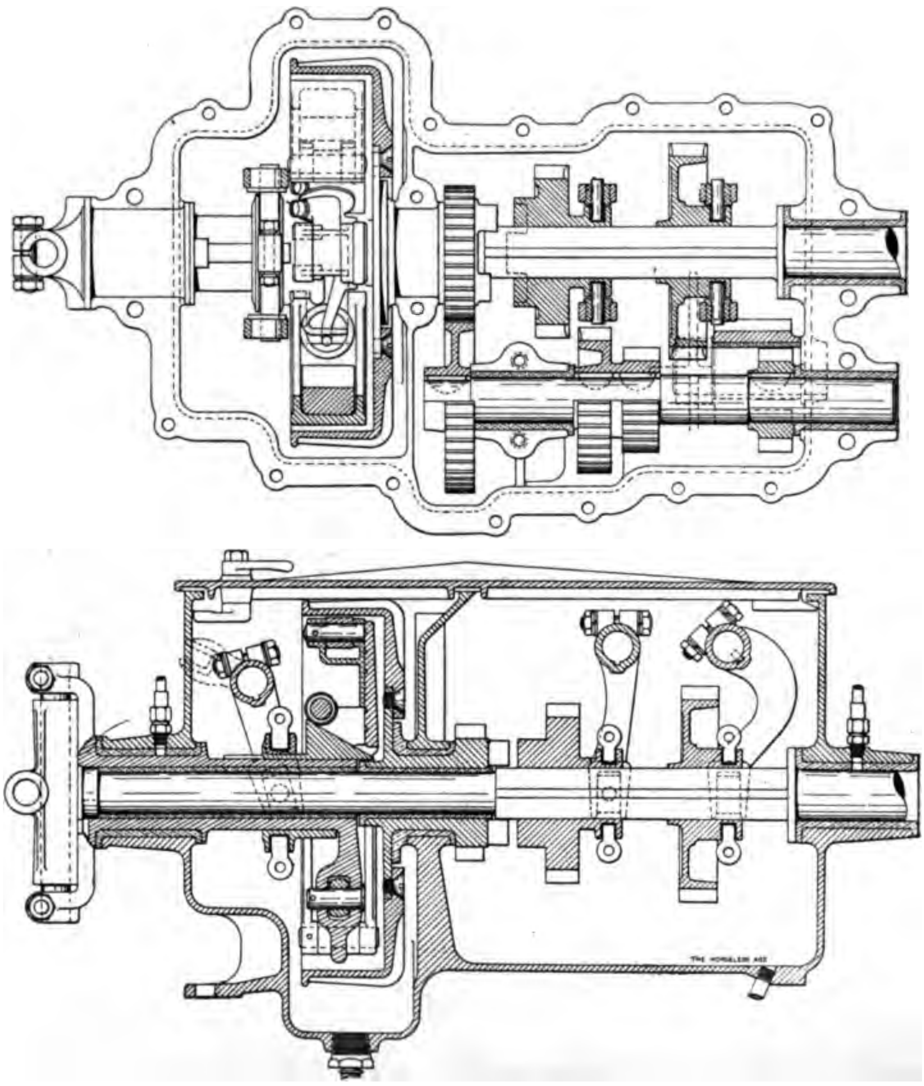
The friction clutch is enclosed in a compartment of the transmission case; it runs in oil, and is thoroughly protected from dirt and injury. It is of the internal expansion type, self-contained, and carefully balanced. The engaging surfaces are metal on metal. The expanding member of the clutch is keyed to the engine shaft, while the driven member is keyed onto the driving-shaft of the transmission. A heavy cross-arm is fitted to the end of the driving-shaft and adapted to receive the ends of the two brake-shoes, which bring apart those points. The opposite end of this piece is slotted to receive a yoke, which slides at right angles to the axis of the transmission, and which is connected by short links with the free ends of the two brake-shoes, thus forming a toggle joint between them, which is thrown into action by a downward movement of the yoke. Two heavy spiral springs are hung between the ends of the yoke and the ends of a similar yoke, mounted on the other end of the driving-bar, and swiveled to equalize their effort. The construction of the sliding yoke, embodies a maller under which a wedge is forced at the will of the operator, thus lifting the toggle and relieving the friction. The wedge, which is spliced to the shaft, is moved laterally by a collar which is actuated by a yoke linked to a foot-pedal. The construction is clearly illustrated in the accompanying cuts of the clutch and transmission.

The effort of the motor is transmitted to the rear axle by direct connections, or through a counter-shaft and one or two sets of sliding gears. The direct drive is by means of a crab-claw clutch.

The manipulation of the gears is effected by means of a double system of linkage and a single shifting lever which may be connected with either set at will by pressure upon it in a certain way. The lever is guided in a two-slotted segment having a connection between the two slots in the middle. The normal position of the lever is in this central slot and in connection with the terminals of the two shifting levers. Pressure outward at once pushes the lever into the "low-reverse" slot and at the same time releases the other point of the shifting mechanism, leaving it locked at the normal point. By drawing the operating lever toward the operator, it may be brought into the "intermediate-high" slot, and the "low-reverse" linkage left locked in mutual. This gives the selective system of operating, with the convenience of handling of a three-speed transmission. At the same time it is thoroughly interlocking.

The gear casing is of aluminum, cast, and is inclined at the same angle as the engine, as has already been said. The driving-shaft has two cordan joints, which, with the universal connection of the engine and clutch, gives considerable latitude for deflection of the frame due to road strains.

The standard equipment of the car includes a light canopy top. The complete weight on tires is 1,800 pounds, and the rated maximum speed is 35 miles per hour.



Plan and Elevation of Gear Box.

COMMUNICATIONS

How Many Cylinders?

Editor HORSELESS AGE:

Mr. French very kindly attempts to answer for Dr. Stapler, my query as to why four cylinders should be given preference. He admits that simplicity is desirable if the user's needs can be met properly and very truly says that a single cylinder machine, although simple, does not give the results wanted. He then claims that four cylinders meet the requirements better than anything else, "although two and three cylinder engines have their uses on lighter vehicles," but he does not say why he prefers the four-cylinder and a heavy vehicle instead of the two or three-cylinder and a light vehicle. He does not say why he prefers the additional complication of the added cylinder when it is admitted by experts that "The four-cylinder engine is scarcely better than the three-cylinder engine." (See *Auto Magazine,* November, 1904, page 850.) He must know that tire troubles increase with the weight, which alone is sufficient argument against a heavy vehicle with four cylinders, and if he prefers four cylinders with its disadvantages, because of its slight advantage over three, why then does he not prefer five or even six instead of four. In short, there must be some best number and some reason why it is best, and that is what I want. The two-cylinder opposed balances well enough for all purposes, but it must be horizontal and has other objections, so I prefer the three-cylinder because it is the simplest form of multiple engine. Its cylinders lie side by side, can be placed in any position desired and the piping, wiring and similar fittings are as simple, short and compact as possible. If the four-cylinder is better than the three for any such plain explicit reasons as these, I, as a student of the subject, want to know it.

His remarks on buggy forms lack substance. We see buggies in use daily throughout the Winter, but most autos are tucked away at the first sign of snow, where they remain until the robins nest again. If we are to judge from what we see, the quicker we adopt buggy forms, the more Winter use we will have. If Mr. French will take a ride in an ordinary buggy, he will find that it is provided with much better springs and rides far more comfortably than the ordinary auto. If the form is being changed because of Winter use, then we should copy the sleigh or the toboggan. If because of the high speed, then the passengers should be provided with cots on which they might recline, so as to lessen wind resistance. If doors to the rear are needed, so that the "loose teeth" may not lose out, how does he explain the fact that the front passengers *get along without doors* as in a carriage. *The auto is not offered the public* as a substitute for the railway coach, but as a substitute for and an improvement upon the family carriage or the light buggy, and the needs of these users must ever be kept in mind. The aristocratic French owner keeps his mechanic to care for the vehicle for him. The average American user must take care of it himself and it must be usable, not only by the head of the family, but by wife and children or it will fall far short of that brilliant destiny foreseen by its original designers. Had anyone told Mr. French two years ago that the American public would awake to the nuisance of a rear door, the information would have been received with scorn, but next year's models more nearly resemble horse surreys than did the tonneau, and this is simply one bit of evidence that carriage forms are best adapted to the needs of the public and are sure to survive. Carriages are frequently driven short stretches as fast as 15 or 20 miles per hour, and the auto of the future on the average American road will not be permitted to go much faster even if it is able to.

The remarks of an old hand like Dr. Longaker on the same page as Mr. French's letter set forth the facts nicely. He mentions an instance where, "The increased horse power of the engine was not an advantage as the weight of the machine was much greater. The earlier model stood up much better in actual daily use," and "Simplicity is the sine qua non." Fashion and folly are frequently synonymous. If we have changes, let us have reasons for them.

CHAS. E. DURYEA.

How to Pull Out a Stalled Auto without Recourse to the "Hay Motor."

Editor HORSELESS AGE:

With a hundred feet of three-quarter inch (diameter) rope, and a hand axe, it ought to be possible to extract a pretty heavy auto from mudhole, side ditch or bridgeless culvert, without the intervention of a "hay motor" and the sacrifice of a three-dollar bill.

Select some stable object as a sapling, a stone, or a fence corner foundation, or sharpen and drive a stake into the side bank so that the rope when attached will draw over some rounded surface of ground. Take from the fence the straightest rail obtainable. Gather sticks, stones, anything, to block up one end of it; when inserted under the rear axle, close to one driving-wheel. With the jack one should always have, set up the rear end of the rail so the wheel is suspended, or at least much of the weight of the machine taken off. The wheel will now "skid" freely.

Now, "snub" the rope around the projecting hub of the wheel, holding the loose end of it snugly so it will bind on the hub and let your assistant turn on the power carefully. The rope if properly arranged will wind on and off and pull the car with a tremendous force in whatever direction you have planted your stake, the axle sliding along the rail. Repeat if this does not take you out of your difficulty. The other driver will be helping to move the machine as it is resting on the ground and through the differential, is dividing the pull with the rope though taking much the smaller share of it, of course.

This reads lengthily, but you will have reached the turnpike if you try it, long before the farmer with rattling rack and jingling trace-chains comes hurrying over the hill to help you out. And your three dollars will pay your next hotel bill.

The crafty builder will now prepare his rear wheel-hubs to suit the idea here first given, and will form it of the proper taper to allow the rope to "side-step" as fresh portions are wound on and off. Any one who has watched the warping of a vessel by rope and capstan, will catch the idea readily.

A piece of gas pipe 2 feet long, one end welded down to a point and the other upset and welded into a knob or head, will make a good "stake" to carry along. The whole outfit need not weigh over a dozen pounds, not counting the jack which everybody touring has already.

J. S. CORBIN.

Steam Experiences.

Editor HORSELESS AGE:

The "troubles" one reads about in every number of HORSELESS AGE are very funny. About 99 per cent. of the woes seem to come from the gasolene fellows. Also about the same per cent. of noise. Some of your readers could not have more trouble if they undertook to run a battleship.

I have driven a steam touring car with flash boiler for two seasons, and it seems to be running better than ever. I have no chauffeur, but my man cleans the car, fills the tanks and keeps it oiled.

It was shipped to me and an instructor came with it, who stayed a day and a half. It has been running as regularly as a good horse ever since, except during the Winter. I live three and one-half miles from the postoffice and have to climb 500 feet coming home. Sometimes I have had to make this trip three or four times a day, and in all kinds of weather. It has reduced the time to town and back from about an hour and a half to 25 minutes. It meets all trains, and if the train is on time, lands the passengers here within five minutes of the same time every trip.

The following is a complete list of all my troubles after two seasons' running:

Two rear springs broken.

Thermostat gave out, but the car ran 25 miles without it.

Vaporizer cracked; I ran the car several days with it in this condition.

Vaporizers have clogged up five or six times when the car was standing with pilot light burning.

Diaphragm in water regulator cracked once, but did not prevent our continuing.

Aluminum exhaust pipe cracked once.

The following troubles made it necessary to stop on the road:

To relight pilot three or four times; a matter of about 30 seconds.

To tighten screws in water regulator twice; this took from five to ten minutes.

To adjust foot brake five or six times; allow one minute.

To fix lubricator belt three or four times; ten minutes. This has been entirely stopped since I put apron on car.

To adjust nut on driving shaft three times. This took about 30 minutes the first time, 15 the second, and five the third.

To open obstruction in gasolene supply pipe twice. This occupied about half an hour the first time, because I did not know its location. The second time I was ten minutes doing it. I would like to meet the man who sets the prices on new parts. He must have more nerve than any living man.

I have run this car about 5,000 miles, which is not much for two seasons, but it has considerably more hill-climbing to do than most automobiles. About one-third of the time is climbing here. It must have ascended at least 100,000 feet in just running from the postoffice home.

In regard to the "finish" of a car I differ decidedly from some of your readers. I think the automobile of to-day is entirely too resplendent. It may be "a thing of beauty," but it is not "a joy forever." My car is not merely a "land yacht." It must work as well as play. One of the great drawbacks is the difficulty of cleaning after a run in the mud. It is some hours' work to put it in any kind of shape again.

Mankind used to ride in beautiful ornate chariots, but we now ride in a buggy. His locomotives were gorgeous with brass bands, red wheels, etc. Where is it all now? And it will be the same with the automobile. The time will come when the demand will be for something more useful than a hot-house flower. Of course, the sundry makers will put that time off as long as possible.

In regard to tire troubles, I have had my share. Tires are a necessary evil. But the clincher tire is a very crude affair. The invention of the evil one. Nothing could be more clumsy. I should think every clincher tire would be ashamed of its maker. Undertake to remove a tire that has been on a few months and you certainly are up against it.

My bills for repairs have been about $100 on the car and $200 for tires. W. S.

Question of Responsibility.

Editor HORSELESS AGE:

Will you let me know in your next issue, if a married lady should own an automobile and her husband should operate it in his business, if he should run into some one, who would be liable for damages, he or she? BEGINNER.

[The driver is responsible, whether he owns the machine or not.—Ed.]

The Cost of Operating a Steam Car.

Editor HORSELESS AGE:

About two years ago you printed some figures of mine relating to the cost of operating a steam-driven motor car, the total cost amounting to 10.42 cents per mile. This result was based upon a total mileage of 4,800, with a very light car, such as would at the present time hardly be thought suitable for a tour of any great length.

It seems to me that it might interest some of your steam-using readers to supplement these figures with the conclusions based on a mileage of over 11,000 in five seasons with three light steam cars. The separate items, taken from carefully kept accounts, are as follows:

Operating expenses:	Cents per mile.
Fuel	1.280
Tires (single tube chiefly)	1.778
Spare parts and repairs	1.899
Lubricants and minor supplies	0.097
Total operating expense	5.054
Charges to capital account:	
Taxes and interest on investment	2.285
Depreciation (estimated)	5.000
Total capital charges	7.285
Total cost	12.339

I think the operating expenses may be taken as fairly representing the average case. The repair account may be somewhat reduced by doing as much as possible on one's own premises; and for minor repairs this is decidedly to be recommended. Repair shops, however, are not only more numerous than ever before, but in many of them a very good grade of work is done—which has not always been the case. I therefore find it as a rule rather better to have the repair shop attend to the more difficult items, or those for which special tools are needed. This adds to one's repair bills, but saves a good deal of dirty and temper-trying work.

The cost of tires seems unnecessarily heavy, but this is a common experience. Comparative figures between single-tube and double-tube tires would be interesting.

Charges to capital account are less capable of exact statement, though they must be included. Interest and taxes are easily figured, but depreciation is largely a matter of judgment, particularly as a car in running order is worth much more to the owner than he can get for it from a dealer. For the above table I have estimated that a light steam car may be expected to run from 12,000 to 15,000 miles before it is ready for the junk-heap, and that in the interim it may be sold at a figure roughly proportional to its remaining "life" on this basis. This is fair agreement with prices quoted for second-hand cars; and whether it fits the case of any particular owner or not, it is a figure that is at least conservative.

As in my earlier communication, depreciation stands for more than half of the total cost of the pleasure of driving a motor car. I do not see any prospect of reducing this proportion. Motor cars are much better in every way than they were two years or even one year ago, but they are driven harder and on longer runs over poorer roads, with correspondingly greater wear. Also to be reckoned with are the constant changes in the external appearance of the newer models, which make it difficult to dispose of a car of older pattern, though its machinery may be in perfect order.

LOUIS DERR.

Freezing in Acetylene Generators.

Editor HORSELESS AGE:

Would you tell through your paper what can be used in water for gas generators to keep it from freezing? Of course, whatever might be used should be something safe to come in contact with carbide, and not interfere with proper generation of gas.

I think that this might be of general interest to your readers.

DR. C. L. WYETH.

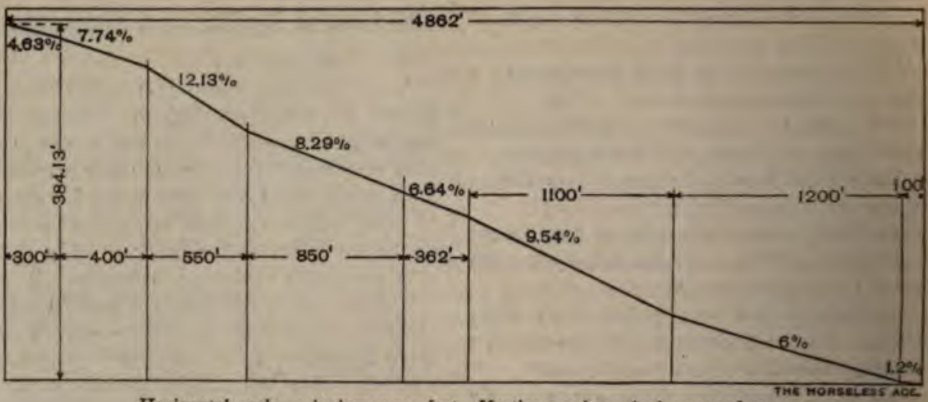
[It is best not to fill the water tank until the generator is to be used. The heat produced during the generation of gas is sufficient to keep the water from freezing, even at a very low temperature. If it is desirable to carry water in the tank when the generator is not in use, it can be kept from freezing by placing the generator where it will receive sufficient heat from the engine or wrapping it in a blanket. Common salt may be added to the water in the proportion of about a teaspoonful to a half pint, but this will attack the brass and necessitate cleaning the tank very often.—Ed.]

Copper Sheathing and Aluminum for Auto Bodies.

Editor HORSELESS AGE:

An editorial in THE HORSELESS AGE of November 16 suggests "copper sheathing for automobile bodies." I believe Dr. Stapler's idea of unpainted aluminum is much better, for the following reasons: "Unlike copper, it does not tarnish, requires no burnishing, and shows dust much less. In contrast with polished or nickled steel aluminum has a pleasing dull finish that is less tiring to the eye. It affords an ideal surface to keep free of mud, dust, and oil with the minimum of labor. It does not scratch easily and has not the slightest tendency to rust, no matter how much it may be exposed to rain, snow, or mud, or how long it may be allowed to stand wet or muddy before being cleaned. I base these remarks upon two years' experience with a popular make of light electric runabout which has wheels with aluminum hubs and spokes. I have used this vehicle daily in all kinds of weather. DR. M. H. BAILEY.

Eagle Rock Hill-Climbing Contest.



Horizontal scale—1 inch = 1,000 feet. Vertical scale—1 inch = 200 feet.

PROFILE OF EAGLE ROCK.

The third annual hill-climbing contest of the Automobile Club of New Jersey was held at Eagle Rock Hill, N. J., on Thanksgiving Day. The number of contestants was large, the course in good condition, the weather favorable, the contest close, and records smashed, so that the event, which occupies a prominent place among automobile sports in the East, was a pronounced success.

There was but three-fifths of a second difference in the times of the first and second in the general classification; Maurice Bernin, who drove W. Gould Brokaw's 60-h. p. Renault, and William K. Vanderbilt, Jr., with his 90-h. p. Mercedes. The former's time was 1.20, which is 16¾ seconds better than the record for the course, which was made by Vanderbilt last year, driving a 40-h. p. Mors. In fact, nine of the contestants succeeded in climbing the hill in less time than he required on that occasion.


BERNIN AND THE WINNING RENAULT.

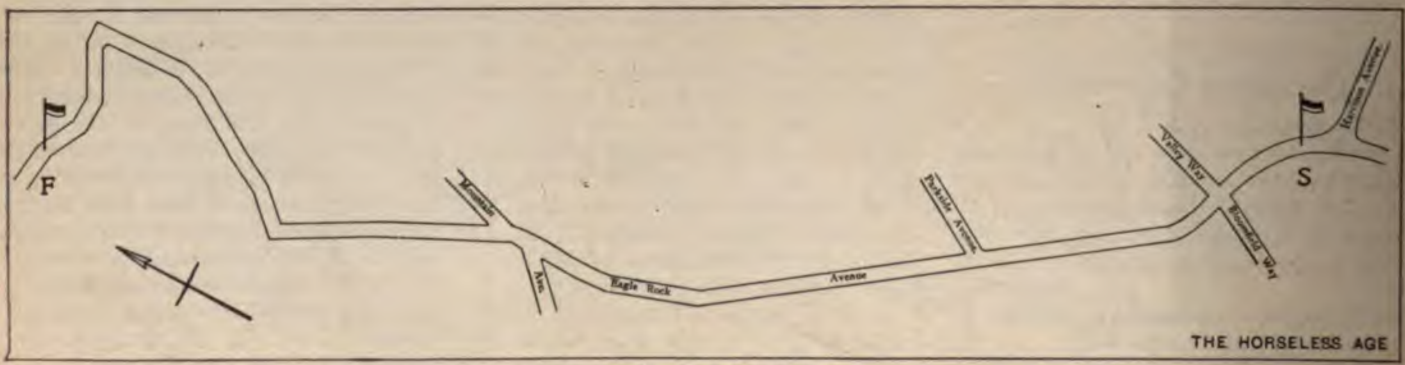
The competing machines were divided into twelve groups, the first eight being for stock cars, classified according to manufacturers' list price, and the last three being for cars classified by weight, and run under the racing rules of the A. A. A. A supplementary class for motor cycles had but two entries. Cars were permitted to compete in several events, one trial being allowed for each, except in case of tire trouble, when an extra run was permitted.

The starting line was located a short distance further down the hill than it was last year, and the contestants were given the advantage of a down grade about two hundred yards long, on which a rapid acceleration could be made before the line was crossed. The result was that the cars were able to accumulate a greater momentum before their times were taken. This, and the fact that the competing cars were equipped with more powerful motors, more than made up for the extra distance to be covered, as shown by the times made.

As the winners were determined on a basis of time only, no attempt was made to start the contestants in classes, but instead they were sent off in the order in which they approached the line. This arrangement served to keep the interest throughout, as there was a chance even up to the last that some fast car might reduce the time of the leader. In fact, the program was considerably more than half finished before the winner—Bernin, with the Renault—had made his first and only attempt, or Vanderbilt had made his second, which placed him second.

Paul Sartori, with A. G. Vanderbilt's 90-h. p. Fiat; William Wallace, with a car of like make and power; and Webb Joy driving a White steam car, were the leaders up to this point, with Wallace's time, 1.23 4-5, the best, and a new record.

Bernin did not reach the course until late in the morning, and immediately made the ascent. He made by far the best start of the day, and took the bad turns with comparative ease, and when he had reached the top it was found that he had beaten Wallace by three and three-quarter seconds. This was his only chance, as he was entered in but one class, but it proved to



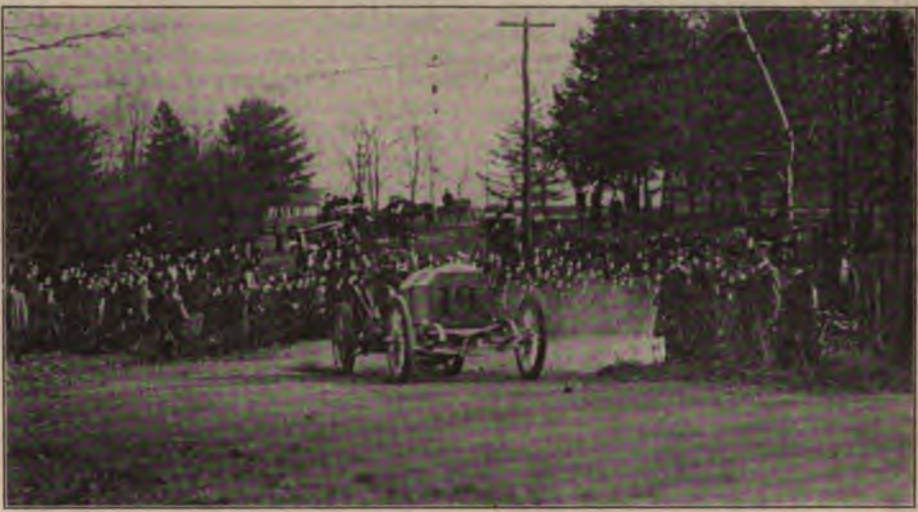
MAP OF EAGLE ROCK COURSE.

VANDERBILT MAKING LAST TURN.

be the only one he needed to carry off first honors. Vanderbilt, having entered in two classes, had another opportunity, and on his second trip up the hill cut several seconds off his former figures. As he came down the incline before the start, an elderly man attempted to cross the road in front of him, and for a time it looked as if an accident would result. Vanderbilt, however, managed to clear him safely.

The two Fiats also had a second trial and both Wallace and Sartori improved their times. The latter dropped into a ditch near the top of the hill and bent an axle.

Among the American machines the best time was made by a 15-h. p. White, driven by Webb Jay. His best time was 1.23 3-5 In an earlier attempt he had not done so well by some five seconds, chiefly because he had traveled some three hundred feet with both wheels in a ditch. He was forced to reverse and start again. The report that he had overturned created considerable excitement for a time, and the spectators crowded out on to the course, so that he was forced to drive through them.



WALLACE TURNING AT TOP OF HILL.

Seventh place in the general list of competitors was taken by another American car—the 70-h. p. Smith & Mabley Simplex, driven by Frank Croker. W. F. Winchester, driving a Franklin, took eighth position.

The winners of the various classes were as folows:

Electric vehicles, all prices—J. W. Aylesworth (Torbenson), 4.22 2-5.

Steam vehicles, all prices—Webb Joy (White), 1.28 2-5.

Gasolene vehicles, price $850 and under—George Paddock (Oldsmobile), 3.06 1-5.

Gasolene vehicles, $850 to $1,250—H. J. Koehler (Buick), 2.18 2-5.

Gasolene vehicles, $1,250 to $2,000—H. W. Alden (Columbia), 3.14 2-5.

Gasolene vehicles, $2,000 to $3,000—M. H. Roberts (Thomas), 2.42 2-5.

Gasolene vehicles, $3,000 to $5,000—W. Walter (Walter), 1.54 2-5.

Gasolene vehicles, over $5,000—William Wallace (Fiat), 1.23 4-5.

Class A, cars weighing 1,432 to 2,204 pounds—M. G. Bernin (Renault), 1.20.

Class B, cars weighing 851 to 1,432 pounds—Guy Vaughn (Decauville), 1.37 1-5.

Class C, cars weighing 551 to 851 pounds—W. F. Winchester (Franklin), 2.26.

Motor cycles—Won by Oscar Hedstrom (Indian), 1.41.

New records were made by the winners of all classes.

Because of the crowds, which were beyond the management of the handful of policemen provided by the West Orange Town Council, Harlan W. Whipple, president of the American Automobile Association, threatened to terminate the competition long before the schedule had been completed. He finally rode over the course, making a personal appeal to the spectators to keep off the road, and withheld the competition until sentries he had stationed at danger points signalled that the course was clear.

Timing was done by the McMurtry system, in charge of Messrs. McMurtry, Butler and Webb. The results were checked by telephone.

THE WHITE ON THE STRAIGHTAWAY.

LEGISLATIVE AND LEGAL.

Cabmen vs. Sight-Seeing Automobiles.

New York, N. Y.—Justice Amend, of the Supreme Court has been called upon to decide whether it is lawful for sight-seeing automobiles to be run through the streets when the companies operating them have not secured a franchise from the Board of Aldermen. The case is that of the Hack Drivers' Union against the Sight-seeing Stage Co., and has come up from the lower courts on appeals. Counsel for the plaintiff contended that under the law the permission of a majority of the property owners along the route followed was necessary and also that of the street railway company whose tracks run through the streets and are followed for a distance of more than one thousand feet. After counter argument by the opposing attorney the judge called for briefs and reserved his decision.

Why a Turnpike Company Objects to Automobiles.

Wilkes-Barre, Pa.—In answer to the alternative mandamus proceedings instituted by Charles E. Bertels in behalf of the Wilkes-Barre Automobile Club to compel the Laurel Run Turnpike Co. to allow the running of automobiles over the boulevard, the company, through their attorneys, have filed the following answer:

"The said automobile did not come into use until about the year 1898, and are now in use by very few people in comparison with the great number who use vehicles drawn by horses.

"The said automobile, by reason of their size, great speed, rivalling the velocity of railway trains, and alarming noise, are extremely dangerous to the traveling public, and their use on public highways is fraught with great danger to travelers who drive horses.

"The said turnpike was designed and constructed expressly for the convenience and pleasure of people in driving with horses over the same, and by reason of grades, high embankments and numerous curves the passage of automobiles over the same would be such a menace as to exclude vehicles drawn by horses, and give to automobiles a complete monopoly of its use.

"In our judgment, safety to the general public peremptorily demands the exclusion of automobiles from our turnpike, and for this reason we refuse passage thereof over the same.

"Not only does the law fail to provide *any toll whatever*, but it would be impossible *to provide any reasonably adequate toll for* automobiles over turnpikes by reason of their character above mentioned.

"Furthermore, we say that between the termini of said turnpike—to wit, between Wilkes-Barre and Bear Creek—there already exists, and for many years has existed, a public road much shorter and more direct than our turnpike, and affording to the petitioner every facility for passage with his automobile.

"Wherefore, we deny that the petitioner, Charles E. Bertels, is entitled to the relief specified in the writ."

It is the intention of the automobile club to fight the matter to the end.

Denver, Colo.—The case of E. F. Burden against George W. Ward has been appealed by the defendant, and as the automobilists of the section are lending their support it is probable that the case will be fought to the highest court, if an opinion favorable to them is not secured before. Burden was awarded $175 damages for injuries alleged to have been received when his horse was frightened at Ward's automobile.

Pittsburg, Pa.—The farmers of this vicinity have unearthed an old law which provides that the owner of any vehicle propelled by other than a horse, mule or oxen should send a mounted guard on horseback at least two hundred yards ahead to warn all, and that each of such strange vehicles should stop three hundred yards from every other vehicle propelled by horse, mule or oxen and allow it to pass. They have purposed that this be enforced against automobilists, but the latter claim that the law was annulled by the law of 1903, which gives automobilists equal rights with other vehicles on the highways.

Nashville, Tenn.—The time limit for registering automobiles under the provisions of the new law expired on November 26. The police department announced that adequate measures will be taken to compel delinquents to comply with the law.

Cleveland, Ohio.—City Solicitor Baker has given an adverse opinion on the long pending Maulberger automobile ordinance, because it seeks to limit speed to seven miles an hour, whereas the State law fixes the speed limit at eight miles an hour.

Utica, N. Y.—The Buckmobile Co. has been made defendant in a suit for $25,000 damages brought by Emma E. Clark. On December 2, 1903, while crossing a street, she was run down and permanently injured by a car owned by the defendant company.

Boston, Mass.—The Supreme Court has ruled in the case of Joseph Baker against the City of Fall River, that an automobile is a carriage within the meaning of the statute making it incumbent on municipalities to keep the highways in repair and safe and convenient for travelers with their "horses, teams, carts and carriages." The plaintiff was injured as a result of his automobile running into a rope stretched across a highway, and the court holds that the city is liable for the injury thus sustained.

New Incorporations.

Seneca Automobile Co., Rochester, N. Y. Capital, $10,000. Incorporators: F. H. Clum, G. W. Robeson, A. H. Dalzell.

McDuffie Automobile Co., Chicago. Capital, $2,400. Incorporators: J. H. McDuffie, W. E. Harvey, H. L. Babcock.

National Automobile Company, Jersey City. Capital, $250,000. Incorporators: Louis B. Daily, H. O. Coughlin, B. Stafford Montz.

International Auto Sight Seeing Co., New York City. Capital, $15,000. Incorporators: M. O. Galvin, T. T. Graham, Florence J. Sullivan.

Hammer Motor Co., Detroit, Mich. Capital, $10,000. Incorporators: Henry F. Hammer, Leon J. Pasyki, Foster W. Allen, Harry W. Nichoalds.

New York Observation Automobile Co.; to manufacture automobiles. Capital, $1,000. Incorporators: M. B. Beckman, A. M. Beckman, S. M. Fischer.

Hartford Suspension Co., Waverly, N. Y.; to deal in automobiles. Capital, $100,000. Incorporators: E. V. Hartford, J. A. Hartford, A. G. Hoffman.

Union Automobile Manufacturing Co., St. Louis, Mo. Capital, $12,000. Incorporators: Benjamin B. Hulbert, George H. Martin and George B. Louderback.

Touraine Motor Co., Newark, N. J. Capital, $25,000. Incorporators: Andrew Kirkpatrick, New York; William B. Llewellyn, Brooklyn; and Warren L. Jacobus, Newark, N. J.

The Auto Garage & Electrical Construction Co., Zanesville, O. Capital, $5,000. Incorporators: C. O. Rosa, J. B. Rhodes, E. F. Triplett, A. A. Douglas, Otto Osborne, L. B. Slocomb.

Trade Literature Received.

The Webb Co., 417 Park Row, New York City. Catalogue of Webb speed indicator.

The Adwear Auto Tire-Sleeve Co., North Attleboro, Mass. Leaflet showing their tire sleeves.

Stolp Manufacturing Co., Chicago, Ill. Catalogue of their wire-cooled tubing for radiators.

Fleming & Cie., Paris, France. Circular descriptive of "Pneu-Cure," a new tire-repairing fluid.

Dayton Manufacturing Co., Dayton, O.—Circular descriptive of the "Avery Lite" acetylene headlights.

New York Gear Works, 56 Greenpoint Avenue, Brooklyn, N. Y.—Catalogue of Ball transmission gears and circulation pumps.

C. J. Bailey & Co., 22 Boylston street, Boston, Mass. Pamphlet calling attention to the Bailey "Don't-Slip" tread for automobile tires.

The Gilbert Manufacturing Co., New Haven, Conn. Poster showing fabric automobile supplies, including storm aprons, tire sleeves, leggings, etc.

Club Notes

HILL-CLIMBING CONTEST OF THE RHODE ISLAND A. C.

The annual hill-climbing contest of the Rhode Island A. C. was held on Saturday, November 26, at Riverpoint. At 11 o'clock the members and their guests assembled at the Crown Hotel, and started for Riverpoint in an informal run. The club was entertained at luncheon by C. Prescott Knight.

The start of the contest was at 2.30 o'clock. The track was in good condition. The summary of the contest is briefly as follows:

Electric Cars.—Arthur Feltham (Waverly), first; time, 1.11 4-5. R. L. Lippitt (Waverly), second; time, 1.43.

Steam Cars.—Blackington (Stanley), first; time, .47 4-5. Baldwin (Stanley), second; time, .52.

Gasolene (Light Cars).—Lippitt (Franklin), first; time, 1.29. Rissly (Columbia), second; time, 1.32.

Gasolene (Heavy Cars).—Adams (Pope-Toledo), first; time, .48. Snow (Peerless), second; time, .48.

In run off, Snow's time was 46 seconds; Adams' 48 1-5 seconds.

The prizes were silver cups for each of the events. There were sixteen entries in all. The contest was arranged by R. L. Lippitt, N. S. Davis and H. D. Wilcox, as committee of the club; and Nelson Davis, Harry Fosdick, Lowell Emerson and R. L. Lippitt, timers. The event was concluded at about four o'clock.

A. C. OF BRIDGEPORT.

The fall meeting of the A. C. of Bridgeport was held on Tuesday evening, November 15. Many interesting reminiscences were related, and Mr. A. L. Riker gave some forecast as to the development in 1905 cars.

NEW JERSEY A. AND M. C.

The meet of the New Jersey A. and M. C., held on November 19, was so successful that a series of monthly contests, to be run off next year, are being considered. Local interest has been greatly aroused during the past year, as is shown by the fact that the club membership has increased from 140 to 340.

TOLEDO A. C.

President Marshall has written the board of public service, complaining of the manner in which the downtown streets are sprinkled. So much water is used, he says, that the pavement becomes dangerous for both automobiles and horses. The board referred the matter to City Solicitor Denman, who ruled that the board can compel the sprinkling company to use less water, and if the order is not complied with the city council may then forbid sprinkling altogether. The matter will be taken up with the sprinkling contractor.

A. C. OF BUFFALO.

The club held on September 20 the first of a series of "experience meetings," which are to convene during the winter. Mr. W. H. Hotchkiss presided. Many interesting and instructive anecdotes were related, and the session was followed by an informal luncheon. The next meeting will be held on December 19.

INTERSTATE A. C.

The Interstate A. C., composed of enthusiasts of eastern Ohio and western Pennsylvania, has been organized in Pittsburg, in opposition to the Pittsburg A. C. The officers are as follows: Joseph Bream, president; John Franks, vice-president; Frank Vincent, secretary; Theodore E. Harris, assistant secretary, and Harry J. Dean, treasurer.

A. C. OF GERMANTOWN.

Two hundred members and guests were present at the reception given in honor of the opening of the club's new $20,000 home on November 23. Although the club is but seven months old, it numbers just one hundred members and is flourishing. The house is a two-story building, having a 45-foot front and 65 feet depth. Garage facilities are provided in the basement, while the first and second floors are equipped in the most comfortable and luxurious manner.

A. C. A.

Mr. Dave H. Morris, the new president of the A. C. A., was tendered a complimentary dinner at the Waldorf on November 22, by the retiring president, Mr. Scarritt. The members of the retiring and present board of governors were present. Compliments were exchanged in informal after-dinner speeches. The feature of the evening was the presentation of a handsome loving cup to Mr. Scarritt by Mr. Morris, on behalf of the board of governors.

NEW YORK STATE A. A.

The directors of the New York State A. A. met at Syracuse on Saturday, November 19. Action was taken formally upholding the motor vehicle law drafted by Mr. W. H. Hotchkiss, and favored by the last Legislature. It is said to be working satisfactorily throughout the State. Favorable comment was expressed upon the proposed enactment to prohibit a driver from operating a car without the presence or consent of the owner. The directors expressed their approval of the action of the A. C. A. with regard to the breaking of road records. The directors also voted to take steps toward having "information boards" posted along the roads from New York to Erie, Pa. The Good Roads Committee was empowered to act in a movement for State improvement of the roads across the Montezuma marshes. Strong measures will be taken to secure the passage of the bill authorizing the State to appropriate $20,000,000 for highway improvement.

The number of clubs in the association was brought up to twelve by the admission of clubs of Binghamton, Norwich and Geneva.

N. Y. MOTOR CLUB.

The New York Motor Club, at a meeting held November 23, discussed the matter of establishing permanent club quarters. Fifteen new members were elected. The first annual meeting and election of officers was set for December 8. Following the business session was an entertainment by the American Biograph Company, which consisted mainly of subjects of interest to automobilists. Particular interest was aroused by views of the Mount Washington contest of last summer, and the Vanderbilt Cup race.

Commercial Vehicle Notes.

David Eccler, of Ogden, Utah, is contemplating a stage line for the vicinity of Logan, using steam wagons.

The St. Louis, Mo., Street Cleaning Co. and the St. Louis Motor Carriage Co. have been conducting a series of tests with motor-propelled street sprinkling wagons. It is probable that the city will soon purchase a wagon of this type.

The Auto Transit Co. has applied to the Commissioner of Washington, D. C., for a permit to operate a line of electric stages, which has been withheld until a complete description of the vehicles to be used and the courses to be followed, have been furnished.

There is a proposition to establish an automobile stage line for the transportation of passengers and freight from Sioux Falls, S. D., to the Black Hills. The distance is 160 miles, and is not covered by railroads. H. M. Avery is said to be behind the scheme.

Ormond-Daytona Races to be Open.

Because of a general feeling among automobilists that if entry for the record trials to be held at Ormond-Daytona Beach, Fla., in January, were restricted to those invited by the management to take part, the event would lack the international character that it is desired to give it, the Florida East Coast Automobile Association has decided to open the list of events to the world. The decision of the club has met with general approval in the belief that under the new conditions the records, if any are made, will be less likely to be discredited in other countries.

Exhibitors at Importers' Salon.

The list of exhibitors at the Importers' Salon, to be held at Herald Square Exhibition Hall, January 11 to 24, has been announced within the past week. Nineteen cars of foreign manufacture will be shown by the makers or their American representatives. Space has been taken for the following cars: Mercedes, Napier, Darracq, Fiat, Panhard, Decauville, Rochet-Schneider, Renault, Richard-Brasier, Mors, Clement-Bayard, C. G. V., Martini, Pipe, Hotchkiss, Westinghouse, Puegeot, Aster and Argyll.

MINOR MENTION

The Niles Automobile Co. are to erect a factory in Evansville, Ind.

Automobile races were held at Sumter, S. C., on Thanksgiving Day.

Up to November 20, 842 automobiles had been resigtered in Rhode Island.

Baltimore, Md., automobilists held a series of races for amateur drivers on November 24.

An effort is being made to ensure the holding of a show in Minneapolis during the early spring.

The Western Motor Company, of Logansport, Ind., have recently built an addition to their factory.

The Union Automobile Co. has been incorporated in St. Louis, Mo., and will handle the Union car.

Nordyke & Marmon, Indianapolis, Ind., are to build a car equipped with a four-cylinder air-cooled motor.

E. R. Thomas has offered a cup valued at $2,500 to the winner of a 25-mile race at the Armond-Daytona meet.

A six-event race meet was held at Houston, Tex., on Thanksgiving Day by the Houston Automobile Club.

The Boston Gear Works, Boston, Mass., are now making a specialty of cams and outer gears for gasolene motors.

It is said that the Electric Vehicle Co. are building a large racing car for the Gordon Bennett Cup team trials.

The Schebler Carburetor Company have moved into their new factory at 129-131 North Alabama street, Indianapolis, Ind.

Seeley Gulick, J. D. Wallace and George E. Martin, of Champaign, Ill., are organizing a company to manufacture automobiles.

The D. T. Williams Valve Co., organized a short time ago in Cincinnati, Ohio, will devote a part of their attention to the manufacture of automobiles.

Pratt A. Brown has been appointed receiver in bankruptcy for the General Automobile & Repair Works, of 764 Eleventh avenue, New York City.

The Michigan Motor & Machine Co., of Detroit, have purchased the old factory of the Rough Wagon Co., at Buchanan, and will move to that village.

The Marion Motor Car Co., of Indianapolis, Ind., are erecting a new factory. The assembling department is to be 120 by 60 feet, and two stories high.

President J. J. Hill and Vice-President L. W. Hill, of the Great Northern Railroad, are using auto-tank cars for short runs over the tracks of the company.

Dinston & Walker, automobile dealers, of Minneapolis, Minn., are to move into a new building on Hennepin avenue, near Seventh street, on January 1.

I. C. Kirkham, of Richard Irvin & Co., New York City, is about to go abroad in the interest of the Maxwell Briscoe Motor Co., of Tarrytown, N. Y.

A complaint has been received at the East Orange, N. J., City Engineer's office from automobilists of the town against the laying of raised crosswalks.

The Premier Motor Manufacturing Co., of Indianapolis, Ind., are constructing a new fireproof factory, which they expect to occupy on or about January 1.

Frank B. Bristol, of Platt's Mills, Conn., president of the Bristol Manufacturing Co., was killed last week when his car was struck by a train on the New Haven road.

Judge Ray, of Norwich, N. Y., has announced that he will give a hearing early in December in the matter of the bankruptcy of the Remington Automobile & Motor Co.

The National Association of Automobile Manufacturers have issued a sanction for a show to be held in Cleveland under the auspices of the Cleveland Automobile Club.

The Banker Bros. Co., automobile dealers, have announced that they will close both their New York and Philadelphia stores and confine their attention to their Pittsburg house.

Fleming & Cie, of Paris, have recently brought out a tire preparation called "Pneu-Cure," which is intended for use in closing cuts in the outer layers of rubber on tire shoes.

A. H. Overman, formerly of the Overman Automobile Co., has been appointed superintendent of the Commercial Motor Co., of Marion, N. J., vice Mr. Woodbridge resigned.

The Michigan Automobile Co., of Kalamazoo, Mich., expect to have two new models for 1905, both of which will have two cylinder motors and side entrance tonneau bodies.

W. W. Gawthrop has been appointed eastern sales manager for the Elmore Manufacturing Company, of Clyde, Ohio, with headquarters at 244 North Broad street, Philadelphia.

The racing board of the Automobile Club of America has received word that the next Gordon Bennett race will be held between July 28 and August 8. The course has not yet been selected.

The William Herrick Co. has been organized in Chicago, to handle the Peerless agency. Mr. Herrick, who was formerly with the Morgan & Wright Tire Co., has for a partner Dan Canary.

A syndicate of New Yorkers is said to have bought the plant of the defunct Housatonic Manufacturing Company, of New Haven, and will use it for the manufacture of automobile parts and brass goods.

The New Jersey Automobile Club was obliged to pay a bill of $298 for repairs to Eagle Rock avenue before the officials of West Orange would grant permission for the contest which was held there on Thanksgiving Day.

The Wayne Automobile Company, of Detroit, Mich., which has hitherto been a partnership concern, has recently filed articles of incorporation. The capital stock is $300,000. William Kelley, with 1,132 shares, is the largest stockholder.

The following new agencies have been placed by the Peerless Motor Car Co., of Cleveland: Canada Cycle & Motor Co., Ltd., Toronto; Amos Pierce Automobile Co., Syracuse; H. E. Frederickson, Omaha; E. H. Moulton, Jr., Minneapolis.

Autombilists of Lockport, N. Y., are endeavoring to induce the supervisors of Niagara County to macadamize the road from Millport to Lockport. This is the only stretch of the road between that town and Buffalo which is not in good condition.

The Elmore Manufacturing Company, of Clyde, Ohio, have appointed the following new agents for 1905: F. W. Dunham, Birmingham, Ala., for the State of Alabama; R. V. Connerat, Savannah, Ga., for Georgia; H. W. Robbins, Media, N. Y.; and W. A. Parker, Mexico.

The Electric Supply Co., Savannah, Ga., W. H. Whitesell & Co., 604 South Broadway, Los Angeles Cal., E. G. Squires, Grand Rapids, Mich., and H. D. Clark, Jr. & Co., 217 E. Fifteenth street, Kansas City, Mo., have recently been appointed agents for the Michigan Automobile Co., of Kalamazoo, Mich.

The Harolds Motor Car Co. has recently been formed in New York City to handle the Olds and Pierce cars. Harry Unwin, formerly secretary of the N. A. A. M., is president and manager, and Edward J. Steiner secretary and treasurer. Quarters will be secured in the neighborhood of Thirty-eighth street.

The Haynes-Apperson Company, of Kokomo, Ind., will put out a new car with a side entrance tonneau body and a four-cylinder vertical motor of 35 horse-power. Their older model will be equipped with a new body, having a side entrance to the rear seat and a folding front seat. It will be driven by a double horizontal opposed engine as before.

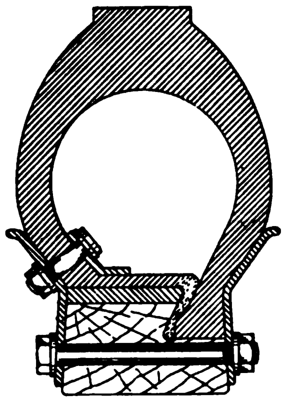
The first annual meeting of the Mahoning Motor Car Co., of Youngstown, Ohio, resulted in the election of the following officers: President, L. E. Cochran; vice-president, W. J. Hitchcock; general manager and treasurer, D. E. Webster. It was voted to put through a lot of fifty cars, equipped with air-cooled motors, after designs by Charles T. Gaither.

The Kokomo Electric Co., recently organized in Kokomo, Ind., are to manufacture a full line of electric ignition apparatus for gasolene engines. The property of the E. S. Huff Co., of Detroit, has been purchased, and will be moved to Kokomo. Mr. Huff will act as electrical engineer, and George Kingston, of the Byrne, Kingston & Co., will act as manager. The latter company will handle the output of the new concern.

MOTOR VEHICLE PATENTS.

774,790. Pneumatic Tire.—Henry Seddon, of Brooklands, England. November 15, 1904. Filed November 24, 1903.

In a tire made in accordance with this invention no separate air chamber or tube is required, as the tire forms an air-tight tube when secured to the felly of the wheel. The tire is formed with an annualar joint near to or at one side of the base and is secured to the felly and sealed by means of side flanges or cheeks, one of which is removable. The other side of the tire may be secured to the metal flange by means of bolts only or by means of an annular ring-clamp in one piece or in segments having bolts passing through it and through the side of the tire and flange. Instead thereof the tire may simply have an inextensible wire or wires inserted into the wall of the tire near to the felly and flange, or the tire may be formed with annular projec-



No. 774,790.

tions, and the flanges with recesses adapted to contain them, a wire being preferably inserted into them.

775,272. Vehicle Tire.—Robert S. Graham, of New York, N. Y. November 15, 1904. Filed March 24, 1904.

This tire consists of a continuous band extending around the wheel, which band is formed of a core of rubber having a longitudinal bore which forms an air-cushion and a space for the inward expansion of material during use, and a covering for this core consisting of ordinary round wire strands wound spirally around the core, which form a durable and at the same time a yielding springy tread-surface. If it were not for the interior bore, says the inventor, the inward movement of one wire would press the rubber out to a considerable extent between other wires, squeezing it between adjacent wires, and these latter wires would gradually by their movement against each other cut off or wear off small particles of the rubber and soon make the wire covering loose on the core. The provision of a space within which the rubber may freely expand reduces this objectionable tendency to a minimum. The wire covering also prevents the stretching of the rubber in a circumferential direction, which is a cause of frequent failures in all-rubber tires. The tire is used in combination with a rim having a channel formed with spiral grooves fitting the spiral wire strands, and thus holding the tire rigidly against any movement in the rim. The tire is formed as a continuous endless band, and in order to apply it to the rim the latter is formed in two halves bolted together.

775,224. Automobile Attachment.—James B. Mott, of Fredonia, N. Y. November 15, 1904. Filed August 5, 1904.

The inventor says: "My invention consists in the application of an essentially triangular-shaped deck-section to the stationary rear deck portion of sloping back runabouts, by means of flanges and fastening-bolts. The removable deck-section has a hinged lid or closure provided with locking device. This deck-section may be placed in or removed from the machine whenever desired, and when in place it greatly improves the appearance of the single-seated machine and furnishes in addition a much larger storage-chamber. By lifting the lid the interior of the chamber may be reached and the fastenings placed in or removed from position, thus securing or permitting the removal of the deck-section whenever desired. The invention may be applied to automobiles having rear decks of various shapes."

774,735. Wheel for Vehicles.—Alexander Boguslavsky, London, England. Nov. 15, 1904. Filed Feb. 29, 1904.

774,771. Self-Propelled Vehicle.—Chester B. Mills, Wilkinsburg, and Anthony Williams, Pittsburg, Pa. Nov. 15, 1904. Filed June 20, 1903.

774,891. Vehicle Wheel.—E. G. O'Brien, of Wellington, Kansas. November 15, 1904. Filed December 22, 1903.

775,009. Vehicle Wheel.—Ralph and Joseph H. Lancaster, of East Orange, N. J. November 15, 1904. Filed January 20, 1904.

A flexible hub wheel supported on two rows of rubber balls around the hub casting, on opposite sides of a guiding flange.

775,103. Internal-Combustion Engine.—James F. Duryea, Springfield, Mass. Nov. 15, 1904. Filed Dec. 22, 1902.

775,150. Automobile.—Soren C. Rockham, of Philadelphia, Pa. November 15, 1904. Filed January 21, 1904.

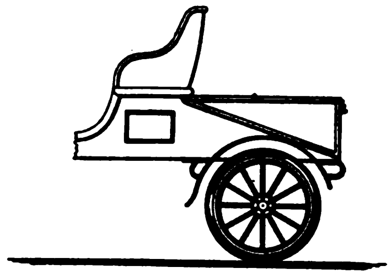
A six-wheeled construction for heavy work, four of the wheels being drivers.

775,213. Metallic Piston-Packing.—Gustave R. Ericsson, Dubois, Pa. Nov. 15, 1904. Filed June 2, 1904.

775,233. Automobile Driving-Gear.—George C. Cannon, New York, N. Y. Nov. 15, 1904. Filed Nov. 5, 1903.

775,243. Explosive Engine.—John S. Losch, Schuylkill Haven, Pa. Nov. 15, 1904. Filed Jan. 19, 1904.

775,314. Explosive Engine.—Peter Schmit, Port Washington, Wis. November 22. Filed April 20, 1904.



No. 775,224.

775,321. Vaporizer for Hydrocarbon Motors.—August Wassman, Astoria, N. Y. November 22. Filed November 24, 1903.

775,361. Rubber Tire.—John F. Byers, Ravenna, Ohio. November 22. Filed February 11, 1904.

775,381. Motor Goggles.—Harry Newbold, London, England. November 22. Filed August 6, 1904.

775,385. Incandescent Igniter for Explosive Engines.—Patrick J. Shouvlin, Springfield, Ohio. November 22. Filed March 19, 1904.

775,403. Traction Vehicle.—Abraham S. Kaplan, Boston, Mass. November 22. Filed February 29, 1904.

775,449. Vehicle-Body Corner.—William B. C. Hershey, Columbus, Ohio. November 22. Filed January 20, 1904.

775,595. Dust Guard for Auto Cars.—William H. Brown, Chicago, Ill. November 22. Filed March 31, 1904.

775,614. Carburetor for Explosive Engines.—George F. Swain, Harvey, Ill. November 22. Filed December 26, 1902.

775,697. Grease Cup.—Fred H. Bogart, New Britain, Conn. November 22. Filed July 25, 1904.

775,722. Friction Tread for Vehicle Tires.—Leo. P. Faison, Golconda, Nev. November 22. Filed June 28, 1904.

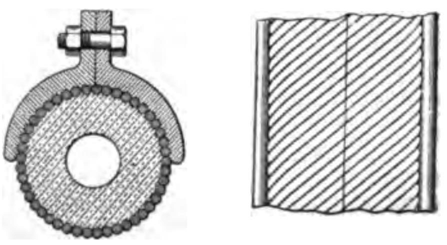
775,753. Vehicle Wheel.—William B. Keighley, Vineland, N. J. November 22. Filed May 12, 1904.

775,757. Friction Clutch or Coupling.—Howard D. Loria, Orchamps, France. November 22. Filed June 24, 1903.

775,765. Vehicle Train.—Charles Renard, Meudon, France. November 22. Filed January 7, 1904.

775,819. Explosive Engine.—Charles Hibbard and Warren Hibbard, Sandyhill, N. Y. November 22. Filed November 30, 1903.

775,820. Governor for Explosive Engines.—Charles Hibbard and Warren Hibbard, Sandyhill, N. Y. November 22. Filed March 8, 1904.



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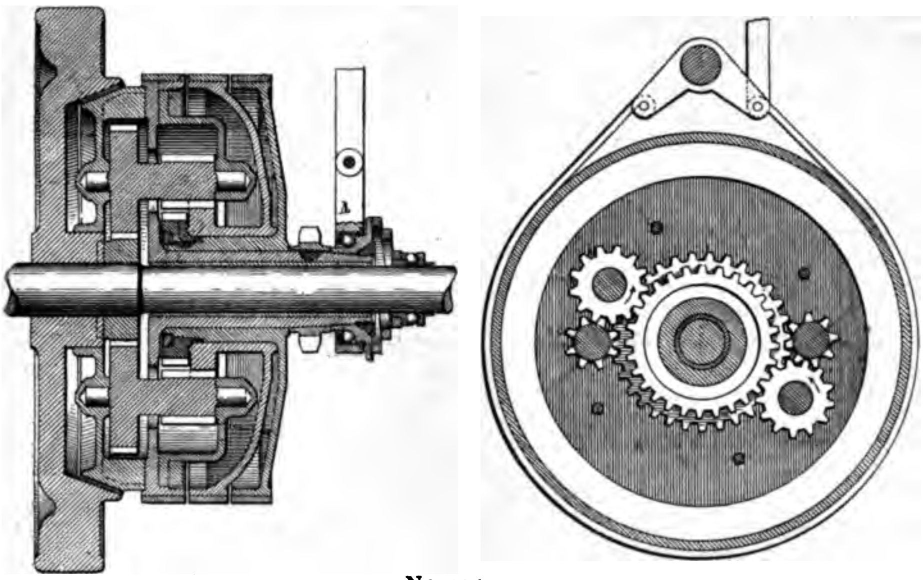


No. 775,409.

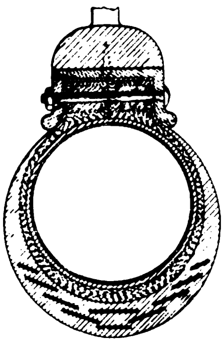
775,355. Chain - Connecting Devices.—Cyrus Edward Smith, of Fall River, Mass. November 22, 1902. Filed July 7, 1904. The device is intended to lessen the difficulty of connecting the terminals of sprocket chains, particularly when they are not readily accessible. It consists of two members adapted to hook into the terminal links of the chain. The distance between the hooks is variable by means of an adjusting thumb-screw, by which the two ends may be brought sufficiently close together to connect the master-link in the usual way. Being light and simple it is particularly suitable to be carried in the tool box for use in emergency repairs.

775,409. Power Transmitting and Reversing Mechanism.—Robert Symonds, of Kenoshe, Wis. November 22, 1904. Filed April 9, 1904. This is an improved form of planetary transmission. The fly-wheel is turned out on the face to receive the male member of the direct or high speed clutch which is adapted to run idle upon the extended base or hub of the same. Bolted to the clutch member, is a annular ring which also embraces a disk which, with the clutch member forms the framework and housing for several stud shafts which carry a pair of pinions of different diameter. One of these pinions meshes with a gear, which is keyed to the driving shaft next to the fly-wheel. The other pinion is adapted to mesh with a pair of idle gears and with a gear which is a part of a sleeve which carries upon its outer end a disk which may be locked at will, to keep it from turning.

A second sleeve riding within the other has a gear mounted upon its inner end and meshed with the idle gears just referred to. The outer end of this sleeve is expanded into a similar disk which is fitted with a brake band as well. Upon the outer end of the sleeve which is a part of the direct drive clutch, is a yoke fitted with suitable anti-friction bearings, and adapted to move the mechanism longitudinally. in order to apply or release this clutch. Mounted on the same sleeve between the yoke and the outer ring or disk is a sprocket from which the power is taken by a chain. Under ordinary circumstances the two outer disks revolve whenever the fly-wheel turns. But if the friction brake be applied to either of them sufficiently to check its motion, the effort of the gears is transmitted to the inner sleeve and causes the sprocket to turn in a diminished ratio dependent on the numbers of teeth in the gears, and in the same direction as the fly-wheel if the pressure be applied to the outer disk, and in a reverse direction if the friction be directed to the second. By applying pressure to a similar bond which surrounds the disk which constitutes the driven member of the direct clutch, a braking effort is transmitted to the whole mechanism and through it to the load to which it is connected.

775,492. Pneumatic Tire for Vehicle Wheels.—Adrian R. Karraman and Oreste Del Guerra, of Chicago, Ill. November 22, 1904. Filed April 27, 1904. The claims of this patent are based on a puncture-proof construction which at the same time does not interfere with the shape and pneumatic resiliency of the tire. The structure embodies a series of metallic strips running lengthwise around the tire and within the tread. These strips, which may be of sheet metal, are so arranged as to serve as deflectors for any object which would tend to puncture the casing. They are so placed as to overlap one another or "break joints," thus protecting the whole of the tread portion of the tire. The inner layer of fabric, which is made up of several plies of suitable material, is much thicker at the tread than at the sides of the casing. At the median line of the base, they meet and turn downward and around to form two annular chambers of rectangular cross-sections, within which are stiffening braces, preferably of metal. The rim, which is of special construction, is in two parts. One, which carries the base of the tire, has an L cross-section, the shorter leg being outwardly at the upper end to embrace the casing. The other part consists of a ring whose section is the same as that of the shorter leg of the first. These two members are held together and embrace the base portions of the casing by a series of transverse bolts which bind the two closely together and clamp the casing to them and in a rigid position upon the rim.

775,503. Change-speed Gear.—Alfred James and Walter Langdon Davies, County of Surrey, England. November 22, 1904. Filed January 18, 1904. This patent is drawn to cover such change-speed gears as have two parallel shafts on which are mounted gears in different ratios, which may be brought into mesh or disengaged by sliding endwise along the shaft. The basic claim is that of a combination of a friction clutch with a positive interlocking clutch operated by the same mechanism as the first, and adapted to do the work of driving, except in starting the load, when the friction clutch is used to bring the driver and follower into synchronism before the positive clutch is applied. The entire mechanism is controlled by a foot pedal, the action being such that a partial movement to release disengages the positive member, while a further movement frees the friction clutch as well. Conversely, the first movement to start the load partially engages the friction clutch, and permits its acceleration without shock.



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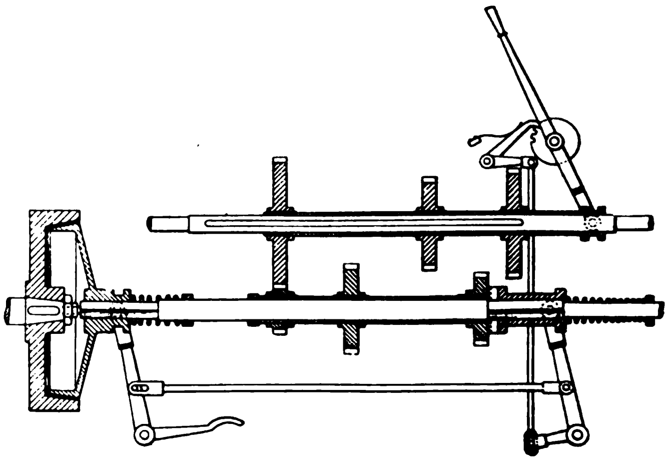

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Devoted to Motor Interests

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Reasons for a Commercial Vehicle Show.

The growing demand for motor propelled commercial wagons, the constantly increasing number of concerns who are devoting either the whole or part of their time to the manufacture of these vehicles, and the lack of sufficient space at Madison Square Garden to supply all those who desire to exhibit at the annual automobile show in New York with room for their exhibits, are in themselves sufficient reasons for urging the holding of a show for commercial vehicles only.

We have already called attention to the fact that one plan which promised to relieve the crowding at the Garden—the division of exhibits by the formation of the Importers' Automobile Salon into those of American and foreign built cars, and the holding of a separate show for the latter in another hall—has practically failed. The situation is, therefore, no better than before, and the necessity still exists for some means of relieving it. While the withdrawal of the commercial vehicles would by no means solve the problem, still it would accomplish something, and for that reason should be welcomed by those more directly interested in the pleasure car.

The chief reason for holding a commercial vehicle show, however, is that manufacturers of such vehicles depend upon an entirely different class of buyers from the most of those drawn to the show at the Garden. This is essentially a show of pleasure vehicles, and the attendance therefore is not the sort that are interested in vehicles intended purely for the world of work. The commercial car, consequently, is relegated to a second place, as it were, and if it comes in for more than a passing glance serves merely to remind the comparatively small number who pause to look it over that the motor has also its sphere of practical usefulness.

Further, the methods which must be employed in selling the two classes of cars are as different as their buyers. The commercial car does not depend so much upon show, style or elegance of finish to find a buyer as does the pleasure car. A sale depends more upon a cold calculation of dollars and cents. It is, or should be, distinctly a business transaction in which the amount obtained for the amount given can be measured in material terms. For this reason the noise, confusion and glare of the present show are not only unnecessary but undesirable from the viewpoint of the commercial vehicle salesman. What he requires is a quiet place where he can exhibit his cars, and then, after having invited in the men who he knows will be interested in his proposition, can sit apart with them and propound his arguments.

As the commercial car is an "all the year round" vehicle, the show could be held at any time during the fall or winter months best suited to the convenience of the exhibitors, and would undoubtedly prove profitable to the manufacturers who would be found among them.

Resilient Wheels.

An old proverb runs: "Drowning men clutch at straws," and in apparently some such spirit as the men of the adage many automobile inventors, realizing the imperfections of the pneumatic tire for serious work, are grasping at every visible expedient in an attempt to solve the problem of securing a combination of resiliency and reliability in the wheels of motor vehicles.

The attainment of resiliency has generally been sought through the material and construction of the tire, and when the problem is thus attacked it is always complicated by the fact that the resilient body—the tire—is also the tractive member and is subjected to all the disruptive and abrasive effects incident to this service.

Of late it seems that inventors are de-

voting renewed attention to the subject of wheels, which are of themselves resilient, independent of their tires.

In constructions of this kind it is possible to employ tires which are more or less rigid and of a character which shall combine a high coefficient of adhesion, noiseless operation, durability and comparative freedom from liability of sudden failure. The resilient structure, being a part of the wheel, but not in contact with the road, is protected from cutting, tearing and abrasion, and may be arranged solely with the purpose of fulfilling its designated function to the best advantage.

Resilient wheels allow of a relative motion between the hub carrying the axle and the portion of the rim which is in contact with the road surface. When the rim strikes a sudden obstruction, such as a stone, although the rim is suddenly lifted in passing over it, the hub and axle are not lifted to any extent, owing to the action of the resilient mechanism in suppressing the shock. A wheel of this class recently patented by a celebrated inventor, is of the disc type—the disc being made up of a large number of sectors of specially adapted wood, externally united by a felloe carrying a tire of slight resiliency. The hub carries two flanges, within which are loosely held the inside ends of the wooden sectors, and between the inside ends of the sectors and the cylindrical surface of the hub is placed a ring of pure vulcanized para rubber. Means are of course provided for conveying the torque of traction from the hub flanges to the disc of the wheel. When the wheel rim strikes an obstruction the sectors adjacent to the point of contact communicate the shock to the portion of the rubber ring upon which their inner ends bear and this is compressed, thus, in great measure, preventing the transmission of the blow to the hub and axle. The rubber ring, being enclosed between the hub, hub flanges and the inside edge of the disc, is protected from the weather and is subjected only to distortion—a disturbance which rubber is well adapted to withstand. Other resilient wheels have been proposed, which contemplate the use of metallic springs instead of rubber, but the principle of all is the same; the permitting of relative motion between the hub and rim against a resilience.

Probably no method of securing resiliency will ever waste so little energy as does the "air spring," which the pneumatic tire affords, as the internal losses in compressing air are small, relatively, to those experienced in compressing other materials, but a considerable degree of inefficiency may be accepted in consideration of a high degree of reliability.

Certainly the renewal of interest in the resilient wheel shows that no stone is being left unturned in the quest for a practical method of securing elasticity, combined with dependability, in motor vehicle running gears—a problem which may, without exaggeration, be called the greatest which now confronts the industry.

High Tension Magnetos for Ignition Purposes.

The magneto alternator applied to the furnishing of current for high tension ignition systems, which has been used abroad for some time past, has begun to be adopted upon American built cars and bids fair to be extensively employed in the future.

An ordinary magneto, if unprovided with a commutator, produces an alternating current, and during each half revolution there is a momentary maximum of electrical pressure produced. Between these pair of maxima there is a point of zero pressure.

In order to employ this commutatorless type of magneto in ignition it must be invariably geared to the vehicle motor, so that one of these maxima of electrical pressure shall occur at the instant when each ignition is desired. For use with a four cylinder engine the magneto must be geared to run at the same speed as the crank shaft of the motor, and may, if desired, be direct connected to it. Since the magneto gives two current impulses per revolution there would be four electrical impulses during the cycle of the engine, and thus one to produce a spark in each of the four cylinders.

The magneto carries upon the shaft a make and break device which provides for the closing and the sudden disruption of the current delivered at each of its points of maximum strength. This current acting through the primary of a specially wound high tension coil produces the desired succession of single spark discharges at the plug. Furthermore, the generator carries a distributer which directs the discharge from a single coil to the spark plug of each cylinder in appropriate order. Means are provided for varying the timing of the spark by changing at will the angular relation of the magneto armature to its driving gear, and thus regulating the time of the current impulse and its break relatively to the crank angle of the engine.

Such an arrangement would seem to have much to recommend it. Since the generator is a magneto, not a dynamo, it is inherently protected from burning out through excessive speed, and no governor is required. Not being required to produce a continuous current, one of its terminals may be attached to the base of the machine and the other to the end of the shaft which forms the "quick break" arrangement, and commutator troubles are thus avoided. As all driving is accomplished by means of gears or a direct connection, there is no lack of positiveness in this system, and since but one coil is necessitated owing to the employment of a distributer, the expense of carrying a spare coil, to use in event of the failure of the one regularly employed, might be considered warrantable. There could be no vibrator troubles, as a plain coil is used. It is possible to make a magneto of this type very nearly waterproof, and as the contact breaker and distributer are integral with it and very little wiring is necessary, the arrangement should be very little subject to accidental arrangement.

The general employment of four cylinder motors renders the employment of primary batteries practically out of the question, and tends to popularize mechanical ignition systems, if they combine certainty, simplicity and durability.

The Use of Single Coils With Multiple Cylinder Engines.

Present practice seems to show a tendency toward the use of but a single coil with multicylinder motors when the jump spark system of ignition is employed. The idea is by no means new, and it is true that at least one manufacturer of prominence, who has used it in the past, has decided to discontinue its use in the future. However, we are not persuaded that the reason for his doing so lies in any fundamental weakness in the system as such, and rather look upon its adoption by a number of makers, who have hitherto employed a separate coil for each cylinder to be fired, as an indication of its merit.

To be successful in operation it is essential that the so called combination commutator, which must be used, should be carefully and substantially constructed. It must be carefully laid out and put together so that the contacts are made at exactly

the right time with regard to the position of the piston in the cylinder; it must be provided with long bearings, so that the proper alignment of the revolving parts and brushes will be maintained at all times; and it must be carefully insulated and made oil and water tight, so that the chances for short circuiting from either of these agents will be reduced to a minimum. When these conditions are fulfilled, however, there are undoubted advantages to be gained from the system.

The first of these is simplicity of wiring. In the primary there need be but a single wire of any length, that running from the contact brush on the commutator device to the coil, as the segments are grounded to the engine half time shaft, and only a short bit of wire is needed to ground the other end of the coil, if indeed a small strip of metal will not serve the purpose as well. In the secondary but four wires are required with a quadruple engine, these running from the terminals of the distributer to the several plugs, and as the commutator is usually located near the engine these can be quite short. This is a decided advantage, as the difficulty of effectively insulating them is reduced with their length. We have, therefore, a system which requires for a four cylinder engine but five wires, and none of these of any great length.

Another advantage lies in the fact that with this method of igniting the charge it is possible to obtain a more nearly perfect synchronism of the explosions. The chance for a variation of the timing in any two cylinders is reduced with the number of parts upon which it depends. In the first place there is in this case but one vibrator, which acts for all cylinders, and as a result the quality of the spark and the rates of combustion of the charge, in so far as the character of the spark can affect it, will be the same in all. Further, there is but a single brush which rests upon the commutator, and, provided the spacing between segments is correctly laid out at the start, the primary contact for all cylinders will be made at the same time, regardless of any wear which may take place on it.

Wear is more likely to occur on the brush than on the commutator, as any one point of the latter is in contact with the brush for only part of the time, whereas the brush is in contact with some part of the commutator all of the time. Hence with wear there is less likelihood of a disturbance of the proper timing in a commutator in which a single brush and four segments are used than there is in one in which a single segment and four brushes are employed. In the former case, as has been said, this wear occurring mostly on the brush will affect all cylinders alike, whereas in the latter case any unevenness of wear on the brushes will disturb the synchronisms of the explosions.

The only possible objection to the system is the extra load thrown on the coil, the result of which is most likely to be seen in burning at the points. This cannot be considered as a serious objection, however, for it has been demonstrated in practice that if the proper material be used in their construction they will withstand the added work satisfactorily. There is, it would seem, less likelihood of the annoyance and bother resulting from the faulty adjustments of vibrators when only one is used, even though it is operating practically all the time, than when four must be watched, as is true of the older system.

Motor Car Propulsion.

By Thos. J. Fay, E. E.

The ability of the motor must equal the requirements of the car, in any case, else trouble will ensue.

The requirement of the car in every instance depends upon two classes of conditions, one of which is a variable quantity, and the other is fixed, or substantially fixed, at any rate.

The variables influencing the propulsion of a motor car can, in brief form, be set down:

VARIABLES IN THE CAR.

(a) The speed of the car.
(b) The carburetor performance.
(c) The commutator performance.
(d) The condition of the lubrication.
(e) The efficiency of the cooling system.
(f) The quality of the tires.
(g) The condition of the tires.
(h) The skill of the operator.
(i) The burden borne by the car.

FIXED IN THE CAR.

(j) The weight of the car.
(k) The construction of the car.
(l) The exposed front area of the car.

VARIABLE OUTSIDE THE CAR.

(m) The condition of the road.
(n) The gradient.
(o) The direction of the wind.
(p) The temperature of the surrounding air.
(q) The barometric pressure.
(r) Traffic congestion.
(s) The altitude.

There are other conditions besides, but, for the sake of brevity and clearness, they will be omitted. The factors enumerated are enough and of sufficient magnitude to fully illustrate the reason why no expressed formulæ can accurately set forth the requirement of a car in the matter of power, excepting in a general way. Nor can it be expected that any car, however well designed and liberally supplied with motive power will surmount all possible variable conditions in aggravated form simultaneously. The personal equation is of supreme importance under aggravated circumstances, that is to say "the skill of the operator" counts for much at times. Or better yet, lack of skill of the operator counts for a repair bill every time.

In a general way it is possible to establish rules of practice that will serve a good end, even in view of the variable nature of the problem, as, for illustration, a moderately well powered car would satisfy the following equation:

$$\frac{W}{100} - \left[\left(\frac{d^2 \times l \times n \times s}{10^9}\right) 4\right] - 0,$$

in which W equals the weight of the car in pounds; d^2 the square of the diameter of the motor cylinder in millimetres; l the length of the stroke in millimetres; n the number of cylinders, and s the angular velocity of the crank in revolutions per minute.

Illustrating, let us assume a car to be as follows:

$W = 2{,}780$ pounds.
$l = 125$ millimetres.
$n = 4$ cylinders.
$s = 1{,}000$ revolutions per minute.

Transposing:

$$d - \sqrt{\frac{\frac{W}{100} \times 10^9}{l\,n\,s \times 4}} - \sqrt{\frac{\frac{2780}{100} \times 10^9}{125 \times 4 \times 1000 \times 4}}$$

$= 117.89$ millimetres.

Hence:

$$\frac{2780}{100} - \left[\left(\frac{117.89^2 \times 125 \times 4 \times 1000}{10^9}\right) 4\right] - 0$$

This formula works out a result in approximate accord with the best present practice when reference is had to moderate speed touring cars and, in fact, general service cars geared to operate at from 30 to 40 miles per hour.

In any car the transmission gear system is quite as important as the motor. The reason is quite easy of discernment, since on the one hand we have the car and its burden, requiring power in accord with the service conditions; while on the other hand we have the motor, limited in its ability. It follows that the transmission gear intervening must supply the variable for the motor since the motor itself possesses but a limited ability, which limit is always below a certain maximum requirement on the part of the car.

Under severe conditions of roadbed and gradient, then, the transmission gear intervenes. In order that the speed of the car may be diminished simultaneously to an increased speed of the motor, thereby increasing the lever advantage of the motor

over the car, the ability of a motor is a function of torque and speed.

Hence:

$$\text{H. P.} = \frac{2\pi R S P}{33{,}000} = \text{horse power.}$$

R = Unity.

And

$$P = \frac{\text{H. P.} \times 33{,}000}{2\pi S} = \text{torque,}$$

Or

$$S = \frac{\text{H. P.} \times 33{,}000}{2\pi P} = \text{angular velocity of}$$

crank in revolutions per minute.

It follows that a motor may operate at a very high speed and at the same time develop a very low power factor or vice versa.

There is a critical point in every motor, i. e., the point in the speed characteristic at which the torque is a maximum. Speeding up beyond this point does no good. Indeed, there is a loss of power involved in doing so, since the friction component increases while the power component remains stationary (provided the increase in speed is not great) in its travel above the critical point.

The ability of a motor, as viewed from the standpoint of its mechanical dimensions, may be set down as follows, viz.:

$$\text{H. P.} = \left(\frac{d^2\, l\, n\, s}{10^9}\right) k = \text{actual horse power,}$$

in which d^2 equals the square of the diameter of the pistons in millimetres; l the stroke of the pistons in millimetres; n the number of cylinders; s the angular velocity of the crank shaft in revolutions per minute, and k a constant for compression and construction.

Transposing:

$$d = \sqrt{\frac{\text{H. P.} \times 10^9}{l\, n\, s\, k}} = \text{diameter of piston in}$$

millimetres.

$k = 4$ when $l = 140$ to 160 millimetres, and all other features of design are as good as the prevailing features in the "simplex" motors. k values may be established for various types of motors. The range of k values, as found by the author in various motors to be had, ranges between 2.8 and 4. (Average 3.22 for all motors, but for the half dozen the average is 3.6.)

Knowing the k value of the torque for speed it is possible to decide very closely the performance likely to follow the use of that motor in a given car, assuming a definite transmission gear.

In a certain case the writer found the motor proved out as follows:

$$\text{H. P.} = \frac{2\pi\, 1000 \times 400}{33{,}000} = 74.$$

R = unity.

$$P = \frac{74 \times 33{,}000}{2\, k\, 1000} = 390.7.$$

$$S = \frac{74 \times 33{,}000}{2\pi\, 390.7} = 1000.$$

The dimensions were in accord as follows:

$$\text{H. P.} = \left(\frac{165^2 \times 170 \times 4 \times 1000}{10^9}\right) 4$$

$$= 74.052$$

$$d = \sqrt{\frac{74 \times 10^9}{170 \times 4 \times 1000 + 4}}$$

= 165 millimetres, nearly.

The agreement between the methods of calculation and the actual brake test would indicate an accuracy within 1 per cent., thus establishing the fact that, considering the type of motor, it is possible to predict from calculations the motor performance within narrow limits.

In the transmission gear it is possible that the ratio of lever advantage might best be an inverted geometrical progression, i. e.:

A—HIGH POWERED CARS.

4th speed, ratio = unity
3d " " = 2
2d " " = 4
1st " " = 8

B—MEDIUM POWERED CARS.

4th speed, ratio = 1½
3d " " = 3
2d " " = 6
1st " " = 12

C—GENERAL SERVICE CARS.

4th speed, ratio = 2
3d " " = 4
2d " " = 8
1st " " = 16

Assuming these ratios of motor speed to driven wheel speed for a given weight of car, say 1,000 kilograms (2,204 pounds), the sizes of motors would change as follows:

RELATIVE SPEEDS CHANGING.

Class A = 80.
Class B = 60.
Class C = 40.

With such an arrangement a car of a given weight would mount a given grade with any of the motors, but not at the same speed. The speed of the car with the smallest of the motors would not be halved, however, because the wind resistance would be less; hence, wind resistance considered, it is possible to effect a comparatively high speed, using a comparatively small motor.

The same reasoning will hold good when reference is made to cars designed to travel at much lower speeds, with no less weight, but using low power motors. As a general statement, considering cars of the best construction, weighing, say, 1,000 kilograms, the attainable speed upon a level, hard, straight course will be:

Class A, 80 h. p. = 80 miles per hour.
Class B, 60 h. p. = 65 miles per hour.
Class C, 40 h. p. = 50 miles per hour.

The accuracy of the above statement depends on a constant weight and a constant front area. It is possible to do better with a 40 horse power car than the figure given in the table, because in a 40 horse power car the weight can be cut down about one-seventh of the weight given for the 80 horse power car. The front area cannot be reduced, however, by a material amount, hence the wind resistance, in pounds per square foot, for any given speed will be nearly the same for each class of cars. And it is on this account that low powered, light weight cars are incapable of winning in a race against high powered, comparatively heavy cars. The power of motors in comparison with weight changes about as follows:

For 25, 50, 75 and 100 horse power a weight of 400, 600, 750 and 900 pounds respectively, including all accessories, such as water pump, commutator, carburetor, piping, &c.

This relation holds good for any given type of motor, under equal conditions of design, within the usual limits of practice.

In the car, assuming the transmission gear to be suitable for the purpose and neglecting wind resistance, the power required, on a level, hard road, will be as follows:

$$\text{H. P.} = \frac{\frac{W}{2000} \times 150 \times m}{746} = \text{horse power,}$$

in which H. P. equals the actual horse power of the motor, W the weight (gross) of the car in pounds, and m the speed of the car in miles per hour.

NOTE.—In a series of tests, under road conditions, the writer found that the expenditure for power in motor cars varied between 50 and 75 watts per 1,000 pounds per mile. The exact expenditure depends upon the exact characteristics of the car in any given case; 150 watts per net ton mile will suffice for an average car on New York pavement.

A car weighing, say, 1,000 kilograms (2,204 pounds), according to this formula, neglecting wind resistance, will require power as follows:

$$\text{H. P.} = \frac{\frac{2204}{2000} \times 150 \times 40}{746} = 8.86 \text{ horse power}$$

at 40 miles per hour.

The power thus found would not be adequate for the purpose of propelling a car of the weight considered for the reasons:

(a) There is no reserve power in the allowance.

(b) The loss through air resistance is not taken into account.

(c) The question of gradient is too serious to be overlooked.

On a grade the power required, in addition to that required on a level, may be estimated as follows:

$$\text{H. P.} = \frac{\frac{W}{2000} \times 20 \times \% \times m \times 88}{33{,}00} = \text{horse}$$

power.

$$\% = \frac{\text{H. P.} \times 33{,}000}{\frac{W}{2000} \times 20 \times m \times 88} = \text{per cent. gradient.}$$

$$m = \frac{\text{H. P.} \times 33{,}000}{\frac{W}{2000} \times 20 \times \% \times 88} = \text{speed in miles}$$

per hour,

which for a 1,000 kilogram car would add to the level road effort the amount as follows:

$$\text{H. P.} = \frac{\frac{2204}{2000} \times 20 \times 10 \times 40 \times 88}{33{,}000} = 23.5$$

horse power.

NOTE.—The effort on a level has been separated from the effect of gradient with a view to clearness.

Wind resistance introduces an entirely different complication, as, for illustration, if the wind is behind it aids the car, and with the wind in opposition the car will be retarded. The effect of wind assistance will not be treated here. It must, however, be taken into account.

The wind resistance in pounds per square foot of front area is a negligible quantity at all speeds below 20 miles per hour. Above that point, however, a corrective for wind resistance must be introduced:

$P = V^2 \times 0.0025$ approximately,

in which P equals the pressure in pounds per square foot and V^2 the square of the velocity of the car in miles per hour.

From which the following tabular values are estimated:

Speed of Car in Miles Per Hour.	Pressure in Pounds Per Square Foot.
20	1
30	2.25
40	4
50	6.25
60	9
70	12.25
80	16
90	20.25
100	25

If we allow 8 square feet for the front area of the car considered for purposes of illustration, we have

$$\text{H. P.} = \frac{4 \times 8 \times m \times 88}{33{,}000} = 3.4 \text{ H. P.}$$

at 40 miles per hour.

We have, then, for the motor, the sum of the three components when climbing a 10 per cent. grade at a speed of 40 miles per hour:

(a) The level road component	8.86
(b) The gradient component	25.5
(c) Wind pressure component	3.4
Total	37.76

Allowing for variations, say, 10 per cent., equals:

$$\frac{37.76}{0.90} = 41.9 \text{ horse power.}$$

A very comfortable load for a 40 horse power motor, but 40 miles per hour is a brisk speed up a 10 per cent. grade.

There would be no evidence of bad judgment upon the part of anyone who might decide to use the third gear for a grade of this magnitude, and thereby making it possible to use a 30 horse power motor.

There would be a distinct gain, on the whole, by so doing, for then the general utility of the car would be materially improved, since the "radius of travel" per tank of gasoline would be considerably greater, and, too, the endurance of the car would be better.

It is believed that in very high powered cars traveling at from 50 to 90 miles per hour there are other retarding influences, as, for illustration, increased friction losses and energy wasted in heating tires, with serious slipping of the driven wheels.

On one occasion the writer was able to verify observations that might be set down in a general way as follows:

Calculating:

$$\text{H. P.} = \frac{\frac{2200}{2000} \times 150 \times 80}{746} = 17.6 \text{ horse power}$$

on a level.

$m = 80$ miles per hour.

$W = 2{,}200$ pounds.

$$\text{H. P}_1 = \frac{\frac{2200}{2000} \times 20 \times 80 \times 88}{33{,}000} = 4.69 \text{ horse}$$

power on a 1 per cent. grade over the horse power on a level.

And

$$\text{H. P}_2 = \frac{16 \times 7.5 \times 80 \times 88}{33{,}000} = 25.6 + \text{horse}$$

power due to wind pressure; considering 7.5 square feet of surface, 16 pounds per square foot pressure at 80 miles per hour.

We have, then, the sum of these components:

	H. P
(a) The level road component	= 17.6
(b) The gradient component	= 4.69
(c) The wind pressure component	= 25.6
Total	= 47.89

which is the actual horse power developed by the motor, not far from 67 horse power; and $67 - 47.89 = 19.11$ horse power expended in overcoming added friction, heating tires and difference between the speed of the driven tire in feet per minute as compared with the speed of the car in feet per minute.

It is fair to expect something of this sort must transpire when a car is making such good speed on a common road none too smooth, for at the Empire track the turning radius has a very marked effect upon speed, resulting from added mechanical losses incidental to lateral pressure brought upon the car.

A New Substitute for Rubber.

The Mexican press mentions a plant called "guayule" as a substitute for rubber. Señor Lic. Carlos Aguirre, general representative of the company La Anglo-Mexicana, S. A., states that the company made numerous experiments in extracting from the shrub the gummy substance it contains and transforming it into rubber. When the success of these experiments was assured, the necessary patents were obtained and a small factory was established at Jimulco, state of Coahuila, which for about a year has been in operation, and $150,000 Mexican currency has been invested. The erection of several similar works in the frontier states is now contemplated. One of these plants is expected to furnish employment to about 500 men, and "guayule" to the value of about $100,000 (Mexican) has been contracted for.—Ernesto Lux, Vice and Deputy Consul.

The Storage and Handling of Gasoline.

BY N. B. POPE.

The increasing use of gasoline in automobiles, coupled with the fact that the greater number of motor cars are housed in localities where buildings are close together, makes it imperative that considerable thought be given to its handling. The physical properties of the fuel are well known, and but a few simple precautions are necessary to secure absolute safety in its use, yet accidents of more or less serious nature are of frequent occurrence.

Municipal authorities and insurance companies are particularly watchful of all premises where gasoline and naphtha are stored or used, and their regulations are so strict and explicit that any mishap in connection with their use may almost be taken as proof of neglect or disregard of the regulations.

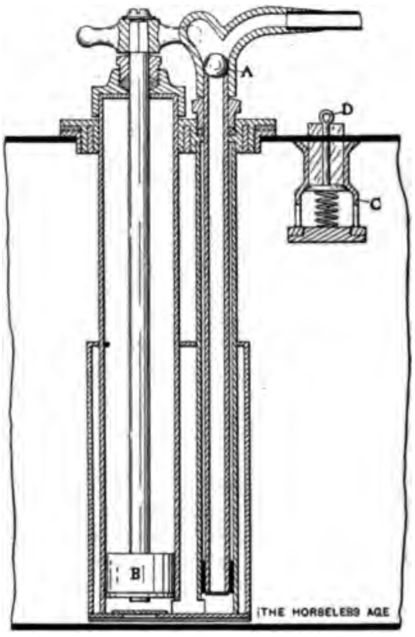


FIG. 1.

In New York city it is a direct violation of an ordinance to keep or use either gasoline or naphtha without a special permit from the fire commissioner. The granting of such a permit involves a declaration of the amount to be kept in stock and the manner in which it is to be handled.

Probably the most important consideration in connection with the handling of fuels and the cars themselves is the proper ventilation of the garage. This should be looked after both on account of the danger from an accumulation of explosive gases and because of the poisonous nature of the exhausts from motors. Generally speaking, garages and stables where machines are kept are sufficiently well ventilated, but repair shops are often located in basements and odd corners where the air is continually stagnant. In places of this sort the worst chances are taken, it being not at all unusual to see a mechanic working with a blow torch within a few feet of an open

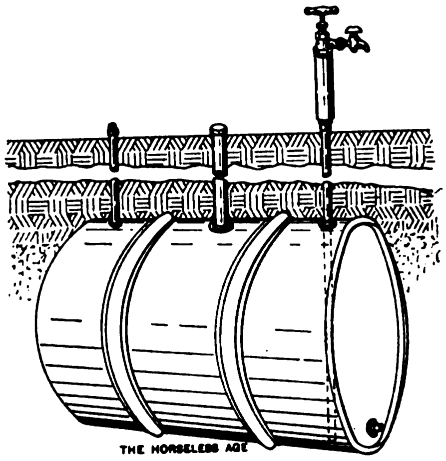


FIG. 2.

can of naphtha, which has been used for cleansing machinery.

In handling inflammable liquids, as far as possible, they should be kept away from the air. Safety cans of various sorts have been designed with a view to reducing the danger as much as possible, and some one of them should always be used where frequent handling is required. A can recommended by the board of underwriters is constructed substantially and arranged to automatically seal itself under all conditions. Fig. 1 shows a section of the pump and filling value of this device.

The delivery pipe is arranged to telescope into the pump when not required, and to swing in any direction for convenience in use. The check valve of the pump is shown by A in the sketch, near the outlet. In action it is lifted into its socket out of the way by the flow of the oil, but at other times is held to its seat by its own weight. Its location permits it to serve the double purpose of check for the pump and an automatic seal on the can. The filling valve C is closed by a stout spring, except when for the purpose of filling it is opened by pressure on the stem D. This provides a self closing filling aperture and a means for returning the drip from the pump back into the tank.

Where the consumption is sufficiently great, or the source of supply at all remote, so that it becomes necessary to have on hand large quantities of fuel, special provision must be made for permanent storage, with due regard to its insulation and isolation, as it were. Handling inflammable liquids involves a twofold danger, first from the ignition of the liquid or its vapor from spark or flame, and second from explosion as a result of fire from an outside source, as, for instance, the burning of a neighboring building.

Insulation may be secured by affording ample ventilation to storage room, and by excluding from it all artificial light and making provision to draw only such amounts as are needed for immediate use. The isolation of the supply is a more difficult matter, especially in the cities, but can be accomplished by burying the tank beneath the ground, or locating it in a stone or brick vault or pit, closed with fireproof doors. It should be borne in mind that gasoline evaporizes at all temperatures, and that the inflammable gas is being given off in the coldest weather as well as in summer, though not in as great quantities. To minimize the danger from an accumulation of vapor, as well as to prevent any possibility of a dangerous pressure being formed, the supply tank and its enclosure must always be kept where a free circulation of air is possible.

The proper location of the supply and method of drawing from it depends largely on circumstances. Wherever it be possible it is best to bury the tank under ground, and pipe the outlet to a brick or zinc lined closet, well ventilated and drained. This may also serve well as a stock room for lubricants, waste, etc.

The supply may be pumped from the tank, drawn by gravity in cases where it be possible to obtain sufficient head, or forced to the desired point by air pressure. When it is impossible to store under ground a fireproof vault may be used and the supply maintained in wooden barrels. But this is not a good method unless the supply is to be used very rapidly, because the necessary ventilation tends to shrink the wood and thereby increase the amount of evaporation or leakage from the barrels.

All empty barrels should be removed from the premises at once, as they are always more or less saturated with oily residuum and are apt to give off inflammable gases, even after they have been lying empty for some time.

It is better to make the arrangement more permanent, using a metal barrel or tank and piping it in a substantial manner, with due care to avoid leakages, to the point where the liquid is to be used. A glycerine drum may be made to serve the purpose very well, or a galvanized iron tank made for the purpose and fitted with suitable piping and a pump must be obtained. The latter is shown in Fig. 2. Another good out-

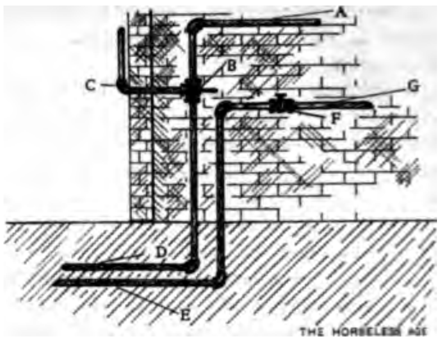


FIG. 4.

fit is fitted with a measuring pump, which may be set to deliver any desired amount from a half pint to several gallons.

The most convenient, and, all things considered, the safest, way to draw off the fuel is perhaps to use compressed air. This is very simple in a station where a compressor and tank are already in use for pumping tires. A three-way cock must be arranged in the pressure line, as shown in Fig. 4, to insure ventilation when no oil is being drawn.

Commercial gasoline is a blending of several different petroleum distillates proportioned to secure the desired specific gravity. Hence the composition varies from lot to lot, and the test alters slightly from day to day sometimes, owing to the separation of the constituents. Because of the uncertainty of the commodity, as well as its known propensities, it is never safe to handle it anywhere in the vicinity of open flame. Safety demands that no open flame lights be used, and that electric wiring be insulated with extra care where gasoline or naphtha is much used. In this connection it should be said that all ventilating pipes leading to tanks and vaults should be protected by wire gauze to prevent any possible communication of fire.

The principle of complete insulation must be carried out in the machine as well as in the stable, as a flooding carburetor or a leaky pipe line may cause its destruction at any moment, as it is impossible to predict just where or when a critical mixture will be found in the vicinity of the muffler, commutator or a lamp.

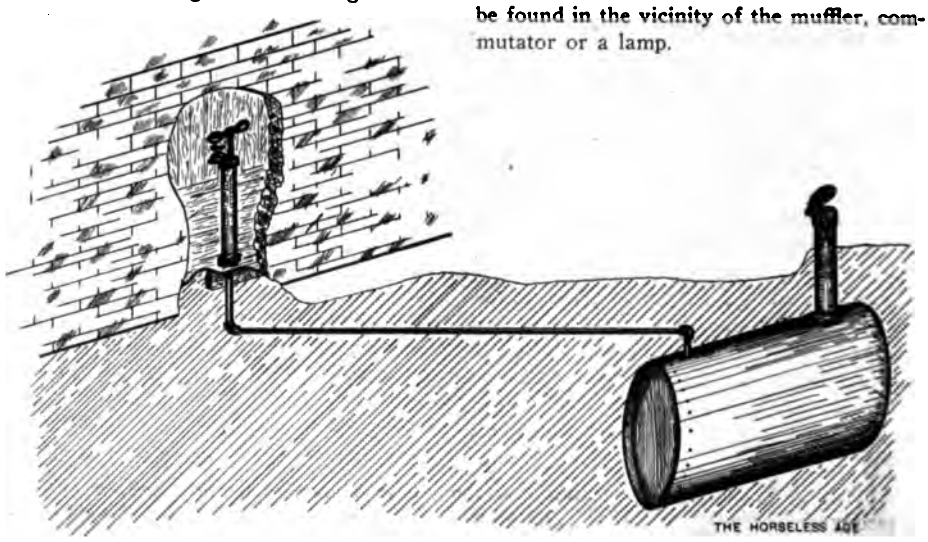


FIG. 3.

LESSONS of THE ROAD

Among the Vermont Hills.

By Hamilton Stuart.

In the past four years I have owned five different automobiles—two steam and three gasoline. Like a great many others I have been trying to find the perfect machine for Vermont's bad roads and steep hills.

I have come to the conclusion that there is no perfect machine, and never will be, but there are quite a number of very good machines on the market, a lot of fair machines and some that are only apologies for automobiles.

STEAM VERSUS GASOLINE.

I notice that the steamer usually catches the beginner, and, like many others, I got caught. When I first bought my steamer I thought there was nothing like it, and it certainly was a long way ahead of a horse. After a time I found another steamer I thought a long way ahead of the one I had bought, and in some respects it was an improvement over the other. At first I did not mind filling tanks, doing a great deal of pumping and putting in half an hour getting ready to start out, but I soon found there were a great many things to be desired in a steamer. I soon tired of everlastingly keeping my mind and eyes on the water in the tank and boiler, the air gauge, the steam gauge and a dozen other things. In a steam machine there is no end of check valves that are always getting clogged in some way; there are valves and piston rods to be packed, and a hundred things that the novice knows nothing about. The burner in any steam machine that I have ever seen will sooner or later give trouble, and plenty of it. A steamer all fired up, with tanks filled, air pressure up and everything in fine order and a good man to run it, certainly does appear to have advantages over a gasoline machine, as it is nearly noiseless, does not vibrate, is very swift for short distances, and starts and stops very easily. But that is not all there is to it. I personally know of over fifty men who have had both steam and gasoline machines, and all except three have sold their steam machines and kept the gasoline.

I am very often asked which I like better, steam or gasoline, and I never hesitate a moment in saying gasoline. At the same time there is a great difference in gasoline machines, a great many on the market being only a source of trouble and botheration to their owners.

Two years ago I had both a steamer and a gasoline machine standing in my barn side by side. During the summer I used the steamer about once a month, but the gasoline car nearly every day. The principal reason for this was that I could give the crank of the gasoline machine a few turns and I was off, while to get the steamer started I had to put in from ten to thirty minutes.

I have often heard men who had steam machines say they could steam up in four or five minutes, and I admit this is true, for I have done it myself when everything was in readiness and happened to work right, but I always notice when a lot of us are off on a run and put up for the night that in the morning when it comes time to start the gasoline machines are ready to go long before the steamers are.

The steamer easily uses twice the fuel the gasoline machine does. Several times when on the road I have been disappointed in getting gasoline and have got a few gallons of kerosene and put it in my tank and I have never noticed a great deal of difference in the way my engine ran. Some people make a great ado if they cannot get 76 test gasoline. In any machine I have had I fail to notice much difference between 68 or 70 and 76, if my carburetor is properly adjusted for the fuel that I am using.

Two years ago after tiring of my steamer and its bother I decided, after looking the field all over, to buy a single cylinder, air cooled machine, with folding front seat and weighing about 1,600 pounds. Some of my friends laughed at me, saying the machine was altogether too heavy, that I would have a big tire bill, that I could not push it if I got stuck, that the engine was sure to overheat, and all sorts of discouraging things. As to tires I will say that I have run this machine nearly every day, in all sorts of weather and over all sorts of roads, mud half way to the hubs, frozen ground, snow and ice, and up to date I have had three punctures, caused twice by a nail and once by a sharp stone, and these I have fixed myself by the roadside in about three-quarters of an hour in each case. I have bought one new shoe and had one tire vulcanized. This is all the tire trouble I have had, and my tires now look good for many more miles. I am asked nearly every day whether I have trouble with my engine overheating, and I can truthfully say that in the 8,000 miles I have traveled with this machine, going up many long, steep hills and through long stretches of mud, I have yet to have my first experience with a hot engine. As to the machine being too heavy, I think a lighter machine would be more desirable for a runabout if it could always be depended on to stand the abuse an auto is sure to get and not break down or require constant repairs. I have never had this machine in a repair shop or got stalled on the road with it, while many of the machines that my friends have bought since I got mine have been in the repair shop very frequently, and I often hear of their being drawn home. I am of the opinion that I shall have a good machine after a great many of the other lighter ones are in the scrap pile.

FURTHER PURCHASES.

I have since bought two cheaper and lighter machines, which, while they have in some ways been fairly successful, have not always been dependable. One was a 4 horse power, air cooled machine of the buckboard pattern. This little machine will go like the wind and is a good hill climber if the hill is not too long, but if the hill is long and I have to work the engine hard it overheats and burns up the oil and I lose compression, and, as every gasoline engine man knows, when you lose compression you lose power. By letting the machine stand a few moments it is quickly cooled off and you are able to go on again.

The machine being of narrow tread, only

Down the Connecticut Valley.

42 inches, is very handy many times, as you can dodge around in places where you could not go with a wider tread, but when you get in the sand or on a rough piece of road it does not work so well, as you have to run one wheel in the loose sand or where it is rough and it takes a lot more power and does not ride as smoothly. I have never had any serious trouble or breakdowns with this machine. Where the roads are fairly good and a man does not feel inclined to put a great deal of money into a machine he might get fairly good satisfaction out of it.

When at the New York Automobile Show last winter I became very much interested in a small runabout weighing about 800 pounds. It had a single cylinder, vertical engine in front, sliding gear transmission and bevel gear drive. This was certainly one of the handsomest little machines I had ever seen, and I finally ordered one. In a great many respects it was a very fine machine. It was strongly made and never broke in any part while I had it, although I gave it some hard tests. It had lots of speed and did good work on the level, but was geared too high and did not have power enough for our hilly roads. This same company are now building a two cylinder machine on very much the same lines, putting in a three speed sliding gear transmission instead of the two speed, and a 12 to 14 horse power engine, and as the machine only weighs about 1,000 pounds it should have power to burn and be very nearly an ideal runabout.

A Nice Place to Go Fishing.

MISSED EXPLOSION.

I have had what at first appeared to be rather a puzzler in the working of my engine. I was coming home one night rather late with my wife and a lady friend when suddenly, as I advanced the spark the engine began to skip explosions. I retarded the spark and the engine ran without a skip, but when I advanced the spark again to get a little more speed or power on the hills, it would skip again. I worked along this way for some time, doing a lot of thinking meanwhile, until it finally got so bad I thought best to stop and have a look. So taking off one of the lights and taking up the footboard, which exposes nearly every part on this machine, I looked everything over carefully, but could see nothing wrong. Finally I began to pull on all the electric wires when one of them, the wire that went to the igniter box, gave way. It had broken off where it was attached to the box, but so rested on it as to make a good contact when the spark lever was only advanced a little, but when it was advanced considerably the position of the wire was changed so that it did not make a good contact. I scraped the rubber insulation off from this wire, hitched it on again and my engine never ran better. Shortly after this I had another experience somewhat similar. My engine would have spells of skipping. I went over the wiring several times, cleaned the spark plug and carburetor, tested out the batteries and did everything I could think of, but it still had these spells. Finally I noticed that this usually happened when I was going over a rough piece of road, and made up my mind there must be a poor contact somewhere. I again went over the wiring very carefully, bending and pulling it, and finally found a wire broken inside the insulation. I connected the ends together and had no more skipping. I account for this in this way: when I was going over smooth roads it made a fairly good contact, but when I came to a rough place the ends jarred apart slightly and so made a poor contact, thus causing the motor to skip. At another time, when I was staying with some friends in Montpelier and my machine was working nicely, we decided one afternoon to wash the machine in the backyard. So we turned the hose on and gave it a general cleaning up. After we had finished I started the engine and ran the machine into the barn, everything apparently working well. That evening we decided to take a ride down the river toward Waterbury. The machine started on the first turn of the crank. We all got in and had gone about 20 rods when suddenly the engine began to skip and soon stopped altogether. I got out and looked things over a little, but could find nothing wrong and so tried it again. It started all right and we went along a piece farther when the same performance was repeated. Thinking we had got some water in the carburetor I took it off, wiped it all dry and put it on again, when the engine started all right, but soon began to skip again and then stopped as before. I then decided to take out the spark plug and see if I could find anything the matter with that. As I took it out I noticed a little water run out of the top of it. This particular make of spark plug has quite a cavity in the top around the porcelain, and in washing this had filled with water and short circuited the plug. But I do not understand why this should work all right when the engine was first started and then suddenly short circuit. After getting the water out of the plug we took a long ride, staying out until after midnight, and the engine carried four of us over the hills and through the valleys with never another skip.

I am very thankful these cold nights that I have an air cooled machine. Nearly all the steamers are laid up for the winter. Some of the water cooled gasoline fellows are trying solutions to keep their cooling water from freezing, but quite often they get caught, with the result that they usually have ruined cylinders.

I have no water tanks to fill and watch, no pipes or radiators to leak and bother, no circulating pump to get out of order. I get rid of a lot of extra weight and have a lot of carrying space that in most machines is filled up with tanks and pipes. I find this carrying space a very desirable feature, as I never go anywhere but I want to carry more or less baggage.

ON A DEER HUNTING TRIP

this fall I took two of my friends with me. We had a tent, camp stove, a large trunk, three large grips, five guns, a lot of bedding and grub enough to last a month. We went over roads you could hardly get over with a wheelbarrow. We went through fields and over logging roads in the woods, and finally left the machine in an old sugar house, where I hid the crank, putting the switch plug in my pocket. We hunted in the country known as the wilderness between Devil Hill and Deer Mountain. Devil Hill is noted in this section for its wonderful scenery. On one side of this hill, or mountain, is an almost precipitous descent of more than 1,000 feet. About 200 feet from the top of the mountain is a cave that has never been fully explored. By crawling, jumping and hanging on to shrubbery one can get to the mouth of the cave, which seems to be a crack in the rocks. After going in a piece you come to a large hole or crack in the bottom of the cave. You drop a stone in

this hole and a long time afterward you will hear it strike the water. After going in a bit farther a light goes out, and if one stays here long he becomes insensible, indicating the presence of poisonous gases.

My wife and I started on a little pleasure and business trip to be away a week or ten days. We left our home one morning in August and went up the Connecticut and Pasumpsic valleys to St. Johnsbury, Lyndonville, West Burk, Willoughby and on to Willoughby Lake, one of the most beautiful bodies of water in Northern Vermont. It is 6 miles long and 2 miles wide, is beautifully situated between two mountains rising almost perpendicular, seemingly from the bottom of the lake.

AN UNEXPECTED BATH.

On one side of the lake at the foot of the mountain is a road, in many places blasted out of the solid rock. In many places it is not possible to pass a team or an automobile, if one happens to be met on this road. If one gets out of the road even a foot in places he will go straight down into the lake. While on this road we witnessed a rather amusing and startling incident. We overtook a steam machine, one with the tiller steering, whose driver was evidently taking away his washing, for he had a basket of clothes on the seat beside him. As we came up behind him he looked around to see what was coming, and just as he did so his machine went over a stone, which threw the basket of clothes against the tiller steering and turned it slightly, when without a second's warning he and his machine plunged into the lake. It so happened that it was a very favorable place to take such a dive, the water not being deep and the bottom sandy. The man was not hurt, but he was thoroughly soaked, more than scared and thought he had lost his machine for good. But we went on to Westmore, got some ropes and help and succeeded in fishing the machine out, and with the united efforts of a dozen men and my machine got it onto the road again. It was not much damaged and after several hours getting the water dried out of them, man and machine continued on their way to have the washing finished.

After getting our friend the driver started on his way we continued on around the lake, as I was looking up a man to whom I had sold a steam launch. Before we got there it was pitch dark, and we were forced to go through the fields and woods with our machine where there was very little sign of a road.

We finally found his cottage and spent two days there, giving him instructions in operating his launch. There are two summer hotels on the shores of this lake and many pretty cottages. I am told there is fine land locked salmon fishing.

After leaving here we went to Barton, Barton Landing and Newport, and then came back to Glover. We spent the night at Glover with friends, and the next day they invited us to go to Stone Pond, where they had a cottage. We spent a very pleasant day at the pond and tried our luck at fishing, but with poor success. The next morning we started for Caspian Lake in Greensboro, where I have a cottage and steam launch. On our way we passed through a deep valley which is now called

RUNAWAY POND.

About eighty years ago there was a large, deep lake here. On the stream that ran from the lake were flour and lumber mills. The owners wishing to get more water to run their mills hired a gang of men and commenced to dig out the channel. When near the outlet of the lake they struck quicksand, which suddenly gave way and in a very short time the entire body of water was rushing down the valley, doing a vast amount of damage, and now the road for nearly three miles runs through what was once the bottom of this lake. After leaving this valley we came to a long hill, very steep and sandy, one of the worst hills I ever tried to mount. I have heard of quite a number of machines stalling on this hill and having to turn back. When we were on the very steepest part of the hill we met a team with a little girl and an old lady driving. The road was very narrow, and I had to run out in the ditch to make room for them to pass and also had to stop the engine as the horse was afraid and they seemed to think they were going to be killed. I often stop the motor and get out and lead a frightened horse by, and in my 15,000 miles of travel over Vermont and New Hampshire hills I have never caused a serious accident.

After getting the girl and old lady safely by I started the engine, threw in the low speed and we pulled on up the hill. Many people have found to their sorrow that it is a very hard thing to start in a bad place on a hill, and this is the only machine I have ever owned that I could depend on to get me out of such a place. This machine has a powerful emergency brake that is applied by a hand lever on the side of the machine, and it cannot be released until you move it. It will slide the wheels anywhere if properly adjusted, and I feel no anxiety in either going up or down a hill, no matter how steep.

It is not safe to use a machine without a powerful and reliable brake that works directly on the rear axle or wheels. Many machines do not have reliable brakes, and if a chain or gear gives way on a hill the chances are ten to one that the machine will capsize.

A HAIR RAISING RIDE.

I once took a hair raising ride down a steep hill backward. I had a machine of the sliding gear type. When this machine is in gear there is a powerful brake operated by pressing the back of the cone clutch against a flange on the crank case of the engine. But when the engine is not in gear with the machine this brake does not work. The emergency brake on this machine was the usual band brake around the differential, and as a great many people have learned to their sorrow these cannot be depended on to hold if they get a little oil on them. In ascending a long hill I had just reached the top and started to throw in my high speed gear when for some unaccountable reason it would not slide in. I tried to slide into the low speed again, but could not. The emergency brake did not hold, and I started down the hill backward and was soon going at the rate of a mile a minute. I managed to keep the machine in the road, trying all the time to slide in one of the gears. When near the bottom of the hill I succeeded in doing this, and gradually brought the machine to a stop. If I had not been able to do this I probably would not be writing this article, as there was a sharp turn and a high bank at the foot of the hill. But to return to our trip. After reaching the top of the hill we spun along at a good clip and soon reached the lake. Caspian Lake is noted as the highest body of water of its size in the United States. It is also noted for its beauty and the abundance of lake trout and landlock salmon caught there. Nearly any time from the first of May until the first of September, the duration of the open season, from daylight to dark, you may see from ten to 100 boats on its surface. For some years past I have spent a few weeks of each year fishing. I remember with pleasure a morning a few years ago. I got up about 3 o'clock in the morning and went out trolling, rowing the boat and holding the line in my mouth. I caught seven large trout before breakfast, one landlocked salmon that weighed 7 pounds and six "lakers," the largest weighing 14¼ pounds. This trout I had (I will add for the doubting Thomases) mounted, and it now hangs over my desk as I write. I also have photographs of the others.

Caspian Lake is fast becoming a famous summer resort. Its shores are now lined with cottages owned by people from many different States.

SPEED VERSUS RELIABILITY.

I find my auto very convenient to take a run to this lake for a few days' outing and fishing, my home being about 35 miles distant. The road is very hard and hilly, and it is a long hard pull for a horse; but with my machine I can make it easily in three hours. I often hear people tell about making a trip in such a time, usually at the rate of 20 to 30 miles an hour, and I think how foolish they are. I used to think it necessary to run my machine at top speed, but I have learned better. If I average 12 miles an hour over our bad roads I am satisfied, and it certainly is as fast as one can agreeably and safely travel over the average road. I recently ran my machine 40 miles over a sandy road in two hours, as it looked as though it would rain every moment and I was anxious to reach home before I got a wetting, but it was altogether too fast for pleasure or safety.

New Vehicles and Parts

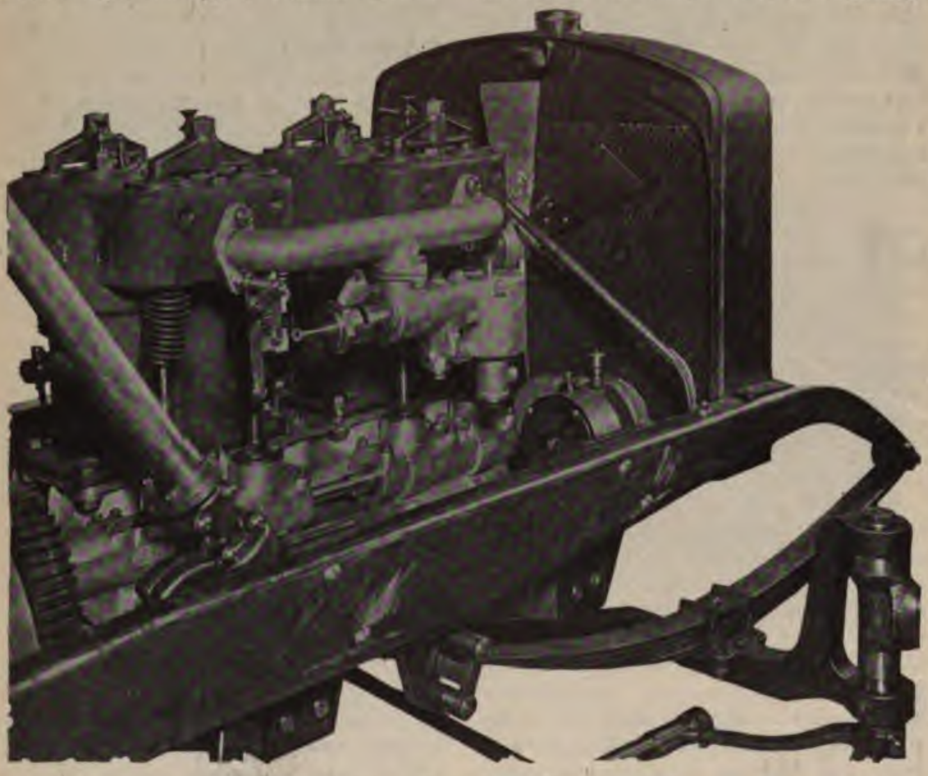
The Smith & Mabley Simplex.

In general design and detail construction the Smith & Mabley touring car, manufactured by the Smith & Mabley Manufacturing Company, of New York city, follows closely the latest foreign practice. It embodies the principal features of several of the more widely known makes and yet contains sufficient originality in the refinement of details to acquire a character of its own. As the manufacturers leave the construction and style of the body entirely to the purchaser and the body maker, we can confine ourselves herein to a description of the chassis.

The main frame is made of cold pressed steel, with side members of the conventional shape, having a channel section. The stock used is three-sixteenth inch thick and is bent to give a depth in the channel of 1¾ inches. At the centre these side members have a depth of 4 inches, which extends uniformly from the rear hanger of the front springs to the rear of the countershaft sprocket bearing. They are given an inward bend at the front of the car to narrow the frame. Only two cross members are used, which are a part of the frame, as such. One of these is that which runs across between the rear ends of the side pieces, and the other that which is placed at about the same distance in front of the rear axle, and from which the rear part of the gear box is hung. The supporting arms on the motor and the forward end of the gear box are depended upon to supply the necessary diagonal rigidity for the forward part of the frame. The riveting of the rear cross member is reinforced and a greater stiffness secured in that part by gusset plates of generous proportions, which are riveted to the side and cross members at the corners.

The rear spring horns are steel forgings which are shaped and are fastened to both the side and cross members. At the point at which they extend out from the frame they form angles of 135 degrees with it, but are bent at a point directly over the longitudinal centre line of the springs, and from there run parallel with the side members of the frame. The purpose of this design is to provide some support for the rear of the car on the spring in case a hanging bolt or link should break.

The forward springs are of the usual semi-elliptical type, slung beneath the side member of the frame. The rear springs, however, embody a novel feature, in that they are not symmetrical with respect to their point of attachment at the rear axle. The distance from the axle to the rear hanger is considerably less than that between the axle and the front hanger. Further, the front end of the spring is some 3 inches higher than the rear. The axle divides the lower leaves equally, the variation being made in the upper ones. This gives a spring of which the rear part is very stiff and the forward part extremely flexible. By this construction, coupled with the comparatively short and stiff springs in front, the makers state that they obtain the same effect as is produced by the spring checks now coming into use. For the ordinary light shocks of running the rear part of the spring acts merely as a stiff strut, which swings the axle about its point of attachment as a centre, and the front part, yielding the necessary amount, absorbs them. Under extra heavy shocks the rear part of the springs serves as a buffer of greater resisting power after the forward part has yielded beyond a certain point.



SMITH & MABLEY SIMPLEX—VIEW OF MOTOR.

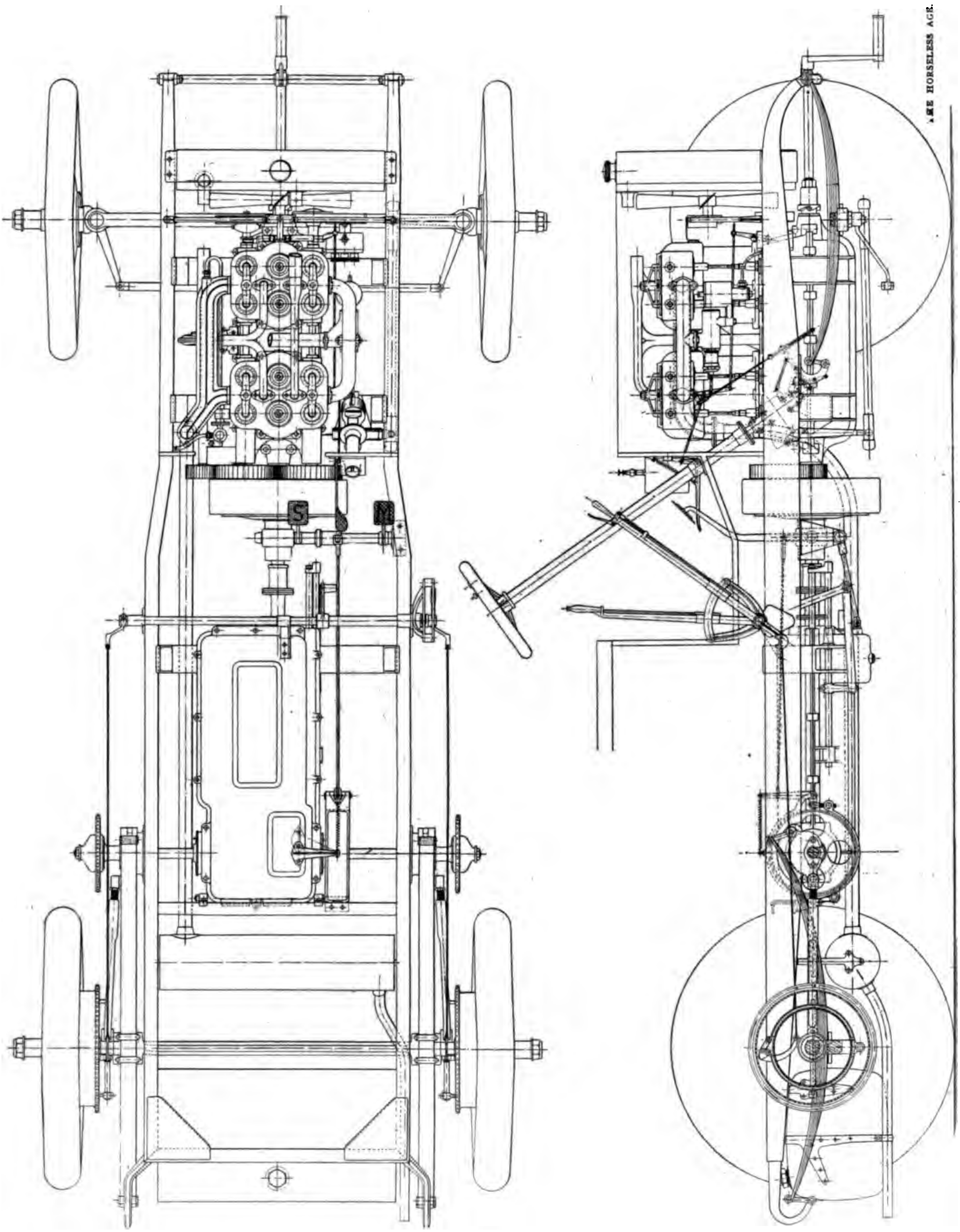
The springs rest upon forged steel axles of solid section, which are bent to lower the frame. The front axle is fitted with large forked steering knuckles made integral with it. Ball bearings are fitted to the top of these, while the lower parts are bronze bushed. The steering arms are extremely short, of large diameter at their inner ends, and are tapered at a considerable angle. Ball bearings of the so called Mercedes type are fitted to the steering wheels.

The wheels are of the artillery type, with second growth hickory spokes, those in the rear wheels being tapered in both directions to the greater elasticity to absorb both side strains and driving shocks. The forward wheels are 910 millimetres in diameter and the rear ones 920 millimetres, the tires fitted being 90 millimetres and 120 millimetres, respectively, and of foreign manufacture.

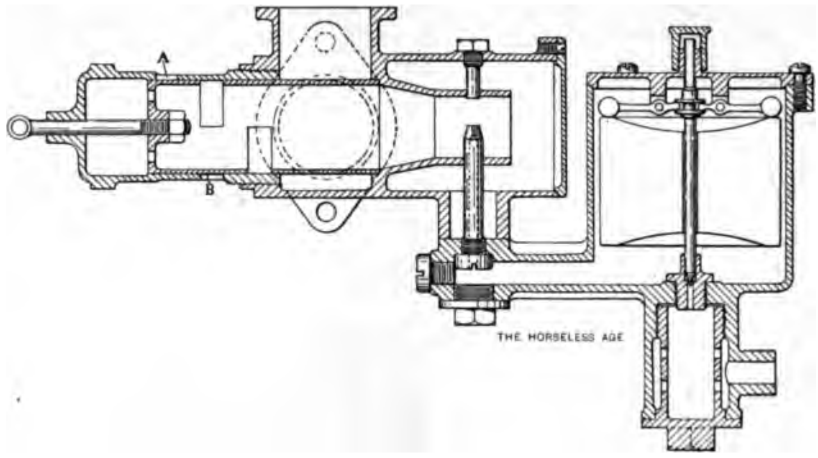
The wheel base is 106 and the gauge 54 inches.

The motor is of the four cylinder vertical type, with the cylinders cast in pairs. The heads are integral with the cylinder walls and are water jacketed. The cylinders have a bore of 4½ inches and a stroke of 5½ inches, and the motor is rated at 30 horse power, with a normal speed of 1,000 revolutions per minute. The pistons are of light construction, strongly ribbed, and each is fitted with four eccentric rings having oblique joints. Drop forged connecting rods are used, having a modified I beam section, and are fitted with velvet bronze bushing at both ends. The wrist pins are of tool steel and the crank shaft of .40 carbon steel, hammered. It is cut from a solid slab and is provided with an intermediate bearing between the pairs of cylinders, which is, as are also those at the ends of the crank case, 4 inches wide. They are formed in the lower part of the crank case, which is provided with four arms, by which the motor is suspended from the side members of the main frame.

The valves are mechanically actuated, and seat in ports formed on opposite sides of the cylinders. They are of nickel steel and are made interchangeable. Strong springs of large diameter, which at the lower ends pass through slots in the valve stems, tend to hold them on their seats. The exhaust and admission valve parts in each pair of cylinders are siamesed, so that a single pipe is used for each purpose in each pair. The valve cam and shaft are of nickel steel and are in one piece, being cut from solid stock. They are driven by a system of large gears located at the rear of the motor and running outside the crank case. The driving gear on the crank shaft is steel, while those on the cam shaft are built up of brass and fibre.



PLAN AND ELEVATION OF THE SMITH & MABLEY SIMPLEX CHASSIS.



Smith & Mabley Simplex Carburetor.

They all have faces $1\frac{3}{4}$ inches wide. The rear bearings, in which the cam shafts revolve, are extended directly up to the gears, to do away with any likelihood of shafts springing. The other bearings rest in channel section compartments which extend along the sides of the crank case and can be entered from the top. They also afford a considerable depth of metal on either side, and therefore serve to reinforce the case against any downward springing under the pressure created by the explosions.

Ignition is effected by the jump spark system, in which a single coil and a combination commutator are used. The latter is driven by a special pair of gears located at the front of the motor on the admission valve side. It is entirely enclosed, and is said to be water tight. Either a storage battery or a generator is used as a source of electrical energy.

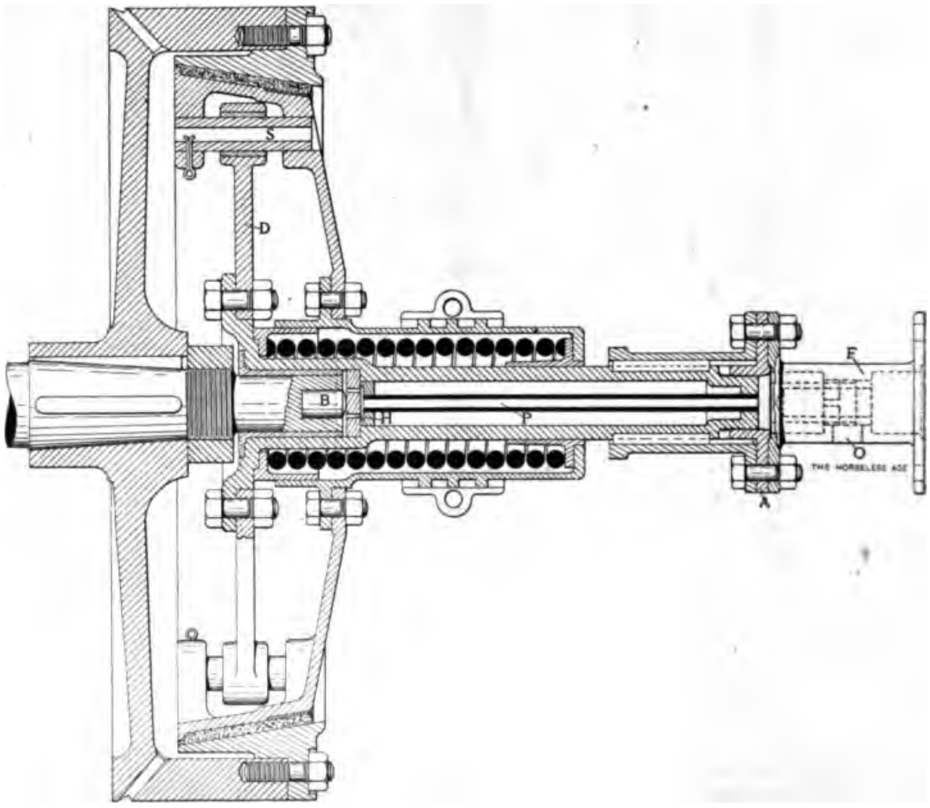
Lubrication is by a pressure feed system provided with sight drips and a separate pipe to each of the principal bearings. Circulation of the cooling water is secured by the use of a gear driven centrifugal pump located at the exhaust valve side of the engine. It is provided with an outlet $1\frac{3}{8}$ inches in diameter, and delivers the water to the top of the motor between each pair of exhaust valves. In this manner the coldest water in the system is forced around the exhaust valve seats. From this point the water is driven down one side of the jacket and around baffle plates which extend vertically to within a short distance of the bottom of the jacket, up the other side and out of pipes which are connected between each pair of admission valves. The water then runs to the top of a cellular cooler placed in front of the motor.

A feature in the construction of the starting mechanism is worthy of mention. The starting handle is supported at its forward end in a bearing which is attached to a cross member, suspended eccentric to the axis of cranking from the ends of the spring horns, and taper allowance is made on the end of the crank shaft to compensate for any deformation of the frame under road conditions. The starting handle is held out of engagement with the pin in the crank shaft by a small flat spring which catches behind a shoulder formed on it.

The carburetor, which is shown in section in the accompanying cut, is of the float feed type. The gasoline is fed to it by pressure from the tank which is suspended from the rear of the main frame, and is drawn from the float chamber through a vertical jet. A long piston valve is fitted in the admission pipe, which is practically a part of the carburetor, and controls the amount of mixture which is allowed to pass to the cylinders. In the sketch this valve is shown closed. To start the motor it is open about one-quarter of an inch. With an opening of this size it is estimated that a sufficient vacuum is created in the pipe at a slow movement of the piston to draw over the proper amount of oil to make starting easy. With the valve in this position all the air used is drawn through the warm air pipe which extends between the pairs of cylinders to the exhaust pipes. This air passes around through the large chamber, seen to the right of the upper end of the gasoline jet, and in through the inner pipe across the top of the jet. As the piston valve is drawn out to increase the speed of the motor two slots cut in its outer end come in time opposite the slots A and B cut in the outside casing. Through these cold air is drawn in increasing quantities, as the slots come more nearly in line, which compensates for the increased suction of the motor and thereby maintains a constant mixture. The action of the fly ball governor which is attached to the half time shaft of the engine tends to close this valve when a certain predetermined speed is attained.

It can be seen from the sketch that ample provision is made for cleaning the various passages and the needle valve. By removing the cap screws above and beneath the jet a wire can be run directly through it, if for any reason it becomes clogged.

The driving power is transmitted from the motor to the change box by a friction clutch which embodies several interesting features. It is of the internal cone type, in which the driven member is leather faced. The driving member is secured to the inside surface of the rim of the flywheel by stud bolts and nuts. The friction surfaces are held in engagement by a large spiral spring, which is enclosed in a



Smith & Mabley Simplex Clutch.

SMITH & MABLEY SIMPLEX DIFFERENTIAL.

housing about the driving shaft. To this is secured the aluminum disk, which carries the leather friction surface, and the means for disengaging the clutch. The latter consists of a collar with three grooves, into which fit a corresponding number of rings formed on the clutch spring housing. On this collar are formed two lugs, which engage with a fork attached to the clutch pedal levers.

When the friction surfaces are in engagement the clutch is, of course, self contained as regards end thrust, but when opened the thrust is taken on a hardened steel button (denoted by B in the sketch herewith), which is set into the end of the crank shaft, and bears against a hardened plate, supported by an annular shoulder formed in the end of the driven shaft bearing. The lubrication of this thrust bearing and also of the main clutch bearing is secured by means of a grease cup, which screws into the hollow shaft at the point to the right in the sketch which is denoted by the letter O. The grease is forced through the pipe P and through four small holes H in the thrust plate, before mentioned, to the thrust bearing, and also to the bearing on the end of the crank shaft. A series of holes are drilled through the flywheel rim so that any excess of oil or any water which may reach the inner parts of the clutch will be thrown out by centrifugal action and will not reach the friction surfaces.

The adjustment of the clutch spring is made by means of the circular plate A. To vary the tension of the spring the bolts which pass through this plate and the flange formed on the end of the driving shaft are removed and the plate turned in one direction or the other to stiffen or weaken the spring, as may be desired. By so doing the distance between the ends of the clutch spring housing is varied. There are six bolts which pass through the flange and plate, so that any amount of variations may be made above that provided by a movement of one hole.

The driving power is transmitted from the friction surfaces to the shaft by two steel arms which are bolted to a flange formed on the inner end of the latter, and are supplied with an eye at their outer ends, through which a hollow pin fits. These pins are fixed in bosses formed on the inner side of the male member of the clutch. As the clutch is opened these pins slide through the eyes in arms. By this construction the aluminum is not called upon to transmit any of the driving strains except that portion between the friction surfaces and the driving pins.

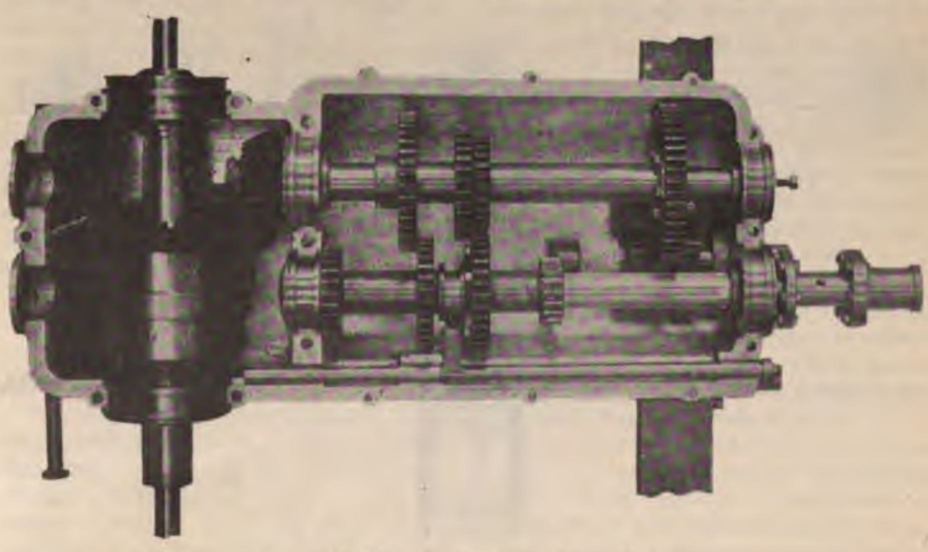
Between the end of the clutch shaft and the driving shaft in the gear box is a double flanged coupling of such length that when it is removed sufficient clearance is provided for withdrawing the clutch bodily from the flywheel.

The change gear system is of the sliding gear type and provides four speeds and reverse. A single reduction is used and but one sliding member. The shafts revolve in Mercedes type ball bearings, which are self contained and are provided with compartments for grease, so that they do not depend for their proper lubrication upon the splash from the oil in the gear case. The sliding member moves on a fluted shaft in which six grooves are cut and all four speeds are obtained by a continuous movement. The change gears are of six pitch and are cut to allow for the slight increase in the size of the teeth due to the hardening process.

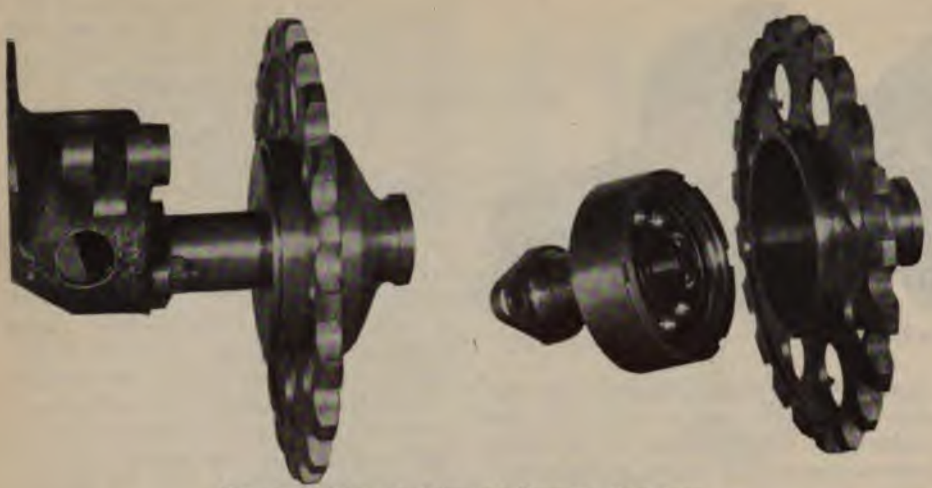
The reverse speed has been made slower than the first speed ahead by using a double reduction in obtaining it. The reverse gear countershaft is located at the forward part of the box, beneath the main driving shaft. It carries two gears of different size.

When the change gear handle is in the neutral position the sliding member in the gear box is in such position that the low speed pinion and the forward and larger gear on the reverse countershaft are in mesh. This countershaft therefore revolves when the clutch is in engagement. In all other cases, except when in use, it remains stationary. To obtain the reverse movement the sliding member is moved toward the front of the gear case beyond the neutral position. The side of the fourth speed pinion is provided with a raised ring near its outer edge, and this in time comes against a similar ring on the side of the smaller gear on the reverse countershaft. As the sliding member is moved along it carries this shaft with it, which is free to slide endwise in its bearings, the gears being secured permanently to it. In this way the smaller of the two gears on it is brought into mesh with the low speed forward driven gear, and as the low speed pinion is in mesh with the larger of the gears the drive is transmitted from the main shaft to the reverse countershaft and then to the driven shaft through a double reduction of gearing. When not in use the reverse countershaft is held in the position shown in the photograph by a stout spiral spring which fits into a cylindrical extension to the gear box. It is the belief of the makers that the reverse should be slower and more powerful than the first speed, and it is to obtain this condition that they have employed this construction.

The bevel driving gears are of four pitch and are contained within the same case as are the change gears. The pinion is secured to the end of the driven shaft by means of a taper and key, and the bevel wheel is bolted to the housing of the differential. This latter part is cut from a solid block of steel and contains a differential group of the bevel gear type, having a single driving pin and one pair of pinions. The end thrust from the bevel driving pinion is taken up by a ball bearing at the far end of the driven shaft, which is made extremely stiff for the purpose, while that from the bevel wheel is



SMITH & MABLEY SIMPLEX GEAR CASE.



Smith & Mabley Simplex Driving Sprocket.

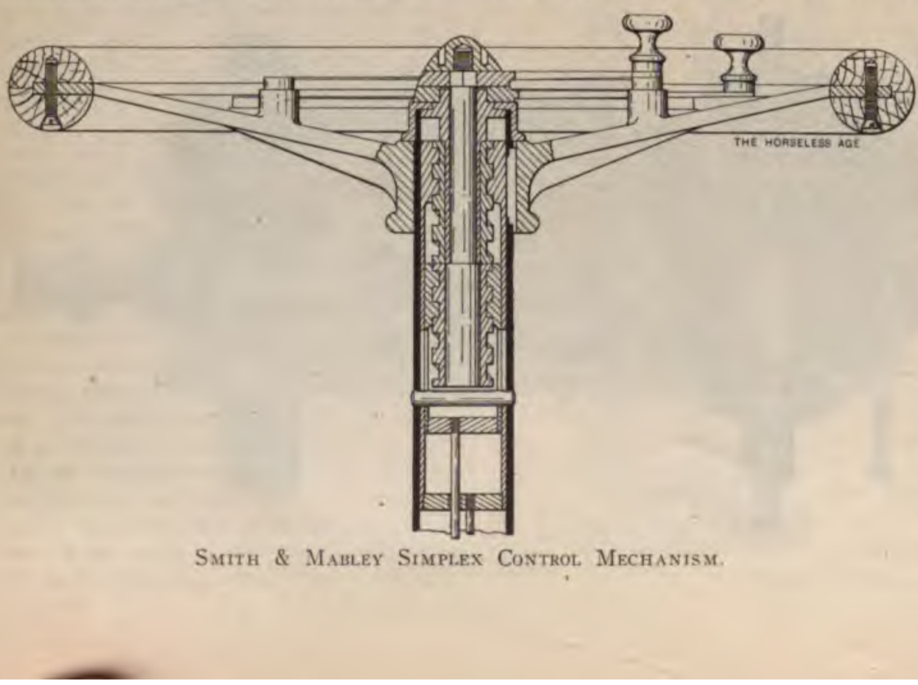
taken by a similar bearing located at the side of the gear case.

The gear case, which, as has been said, contains the change speed gears, the bevel gears and the differential, is hung from the main frame of the chassis. At its forward end two wide arms extend out to and bolt onto the side members of this frame. The rear end, however, is hung by two comparatively small straps of circular section, which are pivoted at their points of attachment to the gear case and to a cross member above, which is bolted to the frame. This construction is employed in order that a certain amount of variation may be possible between the line of power transmission and the centre line of the running gear of the car to overcome any tendency to throw the former out of alignment arising under running conditions.

To the outer ends of the driving countershaft are secured by taper and key combinations the sprockets which carry the chains for transmitting the drive to the rear wheels. The frames which carry the bearings for the outer ends of these shafts have broad bases and bolt securely to the side members of the main frame. A ball bearing is placed directly in the plane of the sprocket, in which the shaft revolves. The sprocket itself is formed from a steel forging which is so shaped as to form a housing for this bearing and protect it from mud and dirt.

The distance rods, by which the adjustment of the driving chains is maintained, are of I beam section and are varied in length by a single screw having a projecting head of cylindrical shape which fits into a hole of corresponding diameter in the forward end of the rod. The centre of the driving sprocket is horizontally in line with the centre of the driving wheels under normal loads, so that an equal variation is allowed both above and below the line as the springs give under road shocks.

Steering is effected by a hand wheel which operates a worm and sector combination, and the control of the motor obtained by a variation of the timing of the spark in the usual manner, and also by shifting the position of the compound valve in the carburetor, either directly, by means of foot accelerator pedal, or by limiting the action of the governor by a hand lever located on the steering wheel. This latter lever and the one for the spark control are connected to square thread screws of large pitch, which are placed end to end in the top of the steering column. They mesh with an internal thread cut in the column, and as they are turned raise and lower two rods, which are connected to them at their upper ends and to the two systems of links and levers at their lower ends. These levers can be seen in the line drawing of the chassis.



Smith & Mabley Simplex Control Mechanism.

Two means of braking are provided, the first consisting of a pedal controlled band brake located on the driving countershaft, and the second a pair of hub brakes on the rear wheels. All breaking drums are of steel and the bands lined with copper. The surfaces are liberal, as can be seen from the dimensions of the countershaft brake, which measures 10¾ inches in diameter and has a face 2½ inches wide.

The complete chassis weighs 2,190 pounds.

The Western Motor Company's Commutator.

The commutator shown in the accompanying sketch is the product of the Western Motor Co., of Logansport, Ind. It is of the wipe-contact type, with the revolving member grounded and the distributing members consisting of segments set into a supporting frame or case of insulating material. The revolving member is secured to the half-time shaft of the motor either directly or through some positive driving means. It carries a small cylindrical brush fitting within a small chamber of similar section, which is secured tangentially to the outside of the shaft and at right angles with it.

Western Motor Company's Commutator.

The brush is held against the inside surface of the ring which carries the distributing segments by a special spring behind it which also takes up automatically for any wear between the brush and ring.

A glass cover is screwed on to the front of the device so that it is dust and oil tight. It can be made for any number of cylinders, and can be fitted either to the motor itself or on the dash.

COMMUNICATIONS

Whistling Carburetor.

Editor HORSELESS AGE:

The writer has a carburetor similar to that one described by W. E. The whistling is caused by what we would call air "saturated" with gasoline. We found that when there was no whistling there was no gasoline. It certainly was a trying problem. The cause was eventually discovered to be from the lost motion of the throttle valve which carries the gasoline adjustment screw. Sometimes the valve would stay up at the top and then a jar of the car would send it down and cut off the gasoline so the engine would barely run. After putting a spring washer under the lever, holding the valve firmly against the top, a permanent adjustment was made and the machine has whistled merrily ever since. JOHN R. SAYLOR.

The Tool Kit.

Editor HORSELESS AGE:

"Lessons of the Road," as published in your paper, are of great interest to the person who has purchased and is learning to operate a machine. I was interested in a recent article in your journal, whose author asks, "What shall one do when the engine stops in an unaccountable manner, etc.?"

Anyone taking care of and operating his own machine gets familiar with the detail of construction, and if much of this sort of thing occurs soon learns where to look for the trouble, very much as a squirrel knows which side of a nut to file to reach the kernel. We have a sort of innate knowledge that the difficulty lies at a certain point.

The way this particular engine stopped would indicate a loose or broken connection or supply of fuel exhausted.

I have operated a gasoline runabout for over a year, and the trouble I have had would have nonplused a more easily discouraged man. My breaks have been about as follows: Three connecting rods, one wrist pin, five cylinder rings, one cone to right rear axle, four springs, two gear casings, one inlet valve, one exhaust valve, two crank case sections, five mudguard braces, an assortment of bolts, coil springs, oil cups and tires galore.

I did not dare go far from home with the machine without my overalls and a full kit of tools.

One of your contributors found a good lot of trouble in disposing of his tools. I solved the problem for myself by making a tool box just large enough to hold the tools I needed—oil can and a box of bolts, cones, washers, cotters, etc.

I have found no better way than to roll the tools up in a long double strip of burlap, very much like a cartridge belt. Separate pockets for each tool would be a nuisance. It is only the work of a moment to unwind the burlap, select the one you want to use and put it back in the same place when through.

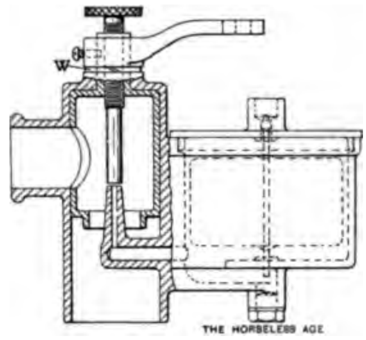
Our troubles we can attribute mainly to luck, or else all the poor material and poor workmanship in the factory got mixed in my machine, for my neighbor has another of the same pattern, purchased only two weeks later, and his has caused him no trouble to speak of, nor has he given it even ordinary care. His expense bill, I should say has been about one-fifth of what I have paid out. E. D. PANNELL.

Word From an Agent.

Editor HORSELESS AGE:

I cannot resist saying a few words in response to the "Word From a Buyer" in a recent issue.

If the buyer would purchase his car through some responsible dealer in his locality instead of dealing direct with the manufacturer or some jobber in the distance, he would have someone to instruct him in all details better than any book of instructions can, and to warn him against the things which cause so many annoyances.



WHISTLING CARBURETOR. WASHER SHOWN AT W.

The dealer might even correct some of the little imperfections in the machine for the sake of making a "satisfied customer" and might be capable of giving better advice than the manufacturer in case of difficulties, being more familiar with the circumstances.

A time is coming when manufacturers will not all be rushed with back orders as they have been in the past, and they will then realize these facts and will encourage dealers to handle their product. A DEALER.

Cooling Oil Catches Fire.

Editor HORSELESS AGE:

The writer reads each week your valuable journal, and considers especially valuable those articles giving "experiences." With the coming of cold weather and the danger of freezing of water in water cooled machines, the question arises as to the best "anti-freeze" circulation medium. Having heard good reports regarding the use of oil, it was determined to give this method a trial. A light oil, said to be especially prepared for this purpose was obtained, the water drained off and the tank of the car (a 1904 curved dash runabout) filled with it.

This was done at the garage, and as there was some slight adjustment of the carburetor needed, the machine was run about a mile and back to the garage, when the engine was stopped. The oil in the tank with the cessation of the circulation poured out of the overflow pipe in the tank, located over the muffler, which latter, being very hot, ignited the oil, and had it not been for the quick action on the part of the machinist with a chemical fire extinguisher, the car would have been inevitably destroyed. An experience of this kind may caution some other owner of this make of machine at least of a possible danger. The tank was immediately drained and filled with a calcium chloride solution which, though it may have other drawbacks, at least cannot get on fire, even should it boil over through the overflow tube. HENRY WALLACE.

Query.

Editor HORSELESS AGE:

I have an 8 h. p. tonneau car that weighs, ready for running, 1,500 pounds. The motor is single cylinder 5x6, but is not strong enough for our Pennsylvania hills, and has been losing power so that it will not carry four persons up very long 10 per cent. grades. The car has been run two seasons, probably 1,500 to 2,000 miles each season. It has an angle iron frame 36x96 inches and a strong body. As the motor is losing power and is developing a "knock," I am undecided whether to have the cylinder bored out and a new piston filled, or to put in a new 14 h. p. double opposed motor. The old single motor weighs about 425 pounds, while the double motor would weigh only 260. In your opinion, is it advisable to improve old cars along these lines? Please give me your opinion, and ask for suggestions from your subscribers who may have made changes to higher power. This season I had my car geared down to 15 miles on high and 6 miles on the low speed. I found this much better for our hilly country, as I could make about as good average time as when geared higher, being able to take ordinary grades on the high gear. My radiator has 13 coils 30 inches long. Would it require a larger radiator for a two-cylinder motor?

PENNA. HILLS.

[We see absolutely no objection to fitting the bigger motor, particularly as it is lighter than the old one. The double cylinder motor will probably run at a much higher rotative speed than the single cylinder, but if you have your car geared to only 15 m. p. h. for the old motor we believe the gearing will not be too high for the new one. If the radiator is easily large enough for your present motor it may also do for the double cylinder, especially as the speed will be

higher and the radiation therefor better, and hills will be climbed in shorter time. It would probably be advisable to try the present radiator with the new motor before deciding on an increase in the size of radiator.—ED.]

Comparative Cylinder Dimensions.

Editor HORSELESS AGE:

At what number of revolutions per minute would it be necessary to run a four cylinder motor to develop 16 horse power with the following cylinder dimensions: 3½x4 inches, 3½x5 inches and 3¾x4½ inches? Engines with cylinders of these dimensions are rated by various makers at 16 to 20 horse power. JUMP SPARK.

[The horse power of a gasoline engine depends upon other factors than the bore, stroke and speed alone. Friction and the compression used must also be reckoned with. It is therefore impossible to tell accurately from the data supplied the speed at which the rated horse power of the various motors is developed. However, for the sake of comparison we may assume that P, the mean effective pressure during the explosion stroke, is 70 pounds per square inch, which is conservative, and that E, the mechanical efficiency, equals .75. Substituting these values in the commonly accepted formula and reducing we have

$$H. P. = \frac{d^2 \times L \times N \times n}{19{,}200}$$

d is the diameter of the cylinder in inches, L the stroke in inches, N the r. p. m. and n the number of cylinders. Letting X represent the unknown quantity, the r. p. m., we have in the first case:

$$16 = \frac{12.25 \times 4 \times 4 \times X}{19{,}200}$$

$$X = 1564 \text{ r. p. m.}$$

In the second case:

$$16 = \frac{12.25 \times 5 \times 4 \times X}{19{,}200}$$

$$X = 1253 \text{ r. p. m.}$$

In the third:

$$16 = \frac{14.06 \times 4.5 \times 4 \times X}{19{,}200}$$

$$X = 1213 \text{ r. p. m.}$$

—ED.]

Queries.

Editor HORSELESS AGE:

1. Can an air cooled motor run 3,000 revolutions per minute and not become hot, even though a perfect mixture be used?

2. Does a motor running at 2,000 to 3,000 r. p. m. soon exhaust the battery (four dry cells 2½x6 inches) so that it will not produce sufficient spark to explode the gas under compression?

3. Why is it that four cells connected, that stand 10, 9½, 9, 9 amperes respectively, read only 7 amperes together?

4. Would four dry cells 3½x8 burn the points of a jump spark coil?

[1. Air cooled motors have been made which can be run at 5,000 r. p. m. without detrimental heating. Whether or not a motor heats at any speed is dependent upon its construction and the surrounding conditions. 2. It depends upon the number of cylinders in the motor and the resistance in the ignition circuit. For a single cylinder four cycle motor a speed of 2,000 to 3,000 r. p. m. means 1,000 to 1,500 sparks per minute, which is very nearly closed circuit work. To obtain satisfactory results from a dry cell battery the resistance of the primary circuit should be comparatively high. 3. Four cells in series should give at least as high an amperage reading as the lowest cell. Possibly in this case the connecting wires are too small or the connecttions poor. 4. Not if the coil were built to stand 6 volts in the primary, as most are.—ED.]

Care of the Motorist's Hands.

Editor HORSELESS AGE:

The article from the *Autocar,* printed in your paper of November 16, on the "Care of the Motorist's Hands," while very complete in its treatment of the subject, omits one method of merit. The fact is overlooked that if the hands are first washed in oil the dirt and grime are completely undermined and the hands can then be freed from oil by any kind of soap.

Lard, vaseline, or any animal or mineral oil will answer the purpose, and while the mineral oil will leave the hands dry the animal fats and oils serve to replenish the natural oil in the skin and leave the hands in good condition. Personally, I have found that sperm oil gives the quickest and best results. Pour half a teaspoonful in the palm of the hand and work in the same manner as with soap; then wipe off the dirty oil and repeat till clean. Washing with soap will remove the oil.

To clean the nails, oil and rub into all the crevices with a soft pine stick—cut wedge shape—using a clean stick and fresh oil until no discoloration remains; then wash with scrub brush and soap.

I have never rubbed the hands with soap before work, but have used vaseline around the nails and find it keeps the grime out unless displaced by hard usage, and, as this is apt to happen, I have practically abandoned the practice. A. F. U. U.

Testing a Coil.

Editor HORSELESS AGE:

My single-cylinder motor has been missing just a little for the last few days. The plug, batteries, connections, secondary wire, ground wire, and the carbureter have all been thoroughly tested, and are all right. I suspect the induction coil itself, and have gone over the contacts carefully. They are clean and bright, and are not rough or pitted. Will you please give me detailed instructions for testing the coil for a possible short circuit or other defect?

EDW. RICE BALDWIN.

[To properly test a coil, it should be disconnected completely from the balance of the ignition circuit. The primary terminals should be connected to a source of electrical energy of which the capacity is known, preferably two well-charged storage cells in series, and the secondary circuit completed by a short piece of wire between the terminals, allowing, of course, for a small jump for the spark. A short circuit in the primary would be indicated by no spark, or a weak one in the secondary, and a spark of considerable size in the primary when the circuit is broken. A punctured or broken-down condenser would be indicated by excessive sparking at the vibrator, which would soon cause pitting. This does not seem to be the trouble with your coil, but rather an internal jump exists in the secondary. To ascertain if this is the case the distance across which the spark jumps should be gradually increased as the primary circuit remains closed, and if it is found that the spark suddenly disappears at a certain point which represents a jump of much less than three-quarters of an inch, it is evident that the current is jumping inside the coil, between two points which are somewhat nearer together. If short enough, an internal jump will prevent the current from jumping across the points of the plug within the cylinder, as it will take the easier course, though possibly longer jump, through atmospheric pressure.—ED.]

More Carburetor Trouble.

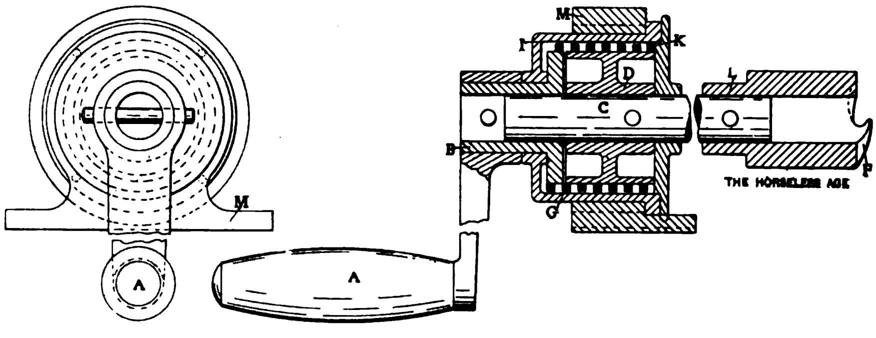
Editor HORSELESS AGE:

I have recently experienced what is to me a new variety of carburetor trouble. Mine is a Kingston engine of 8 horse power. Last Saturday it ran splendidly, but failed to start on Sunday morning, and I have not been able to make it run since. Am using same gasoline, fired a good spark, good compression and everything as favorable as when the motor was running fine. Thinking the carburetor had become clogged in some way, I took it apart and cleaned it thoroughly, but with no better results. If I turn the engine very slowly it will ignite and explode at the right point, but the explosion seems to be weak and does not send engine ahead as it should. If I turn the engine fast it does not seem to ignite, whether there is little or much gasoline turned into carburetor. If I had changed gasoline I would suspect that that were the trouble. Can you or any one of THE HORSELESS AGE readers give me any information from the above description of the difficulty? W. C. K.

[It would seem that the difficulty were not with the carburetor at all, but with the ignition circuit. It is possible that the commutator needs adjusting, as it may make a good contact at a slow and not a high speed, or the batteries may be weak. The fact that an explosive mixture is drawn over at slow speed would indicate that the carburetor were not at fault, especially since the trouble appears to have developed during a period of rest.—ED.]

OUR FOREIGN EXCHANGES

An Unsafe "Safety" Starting Crank.

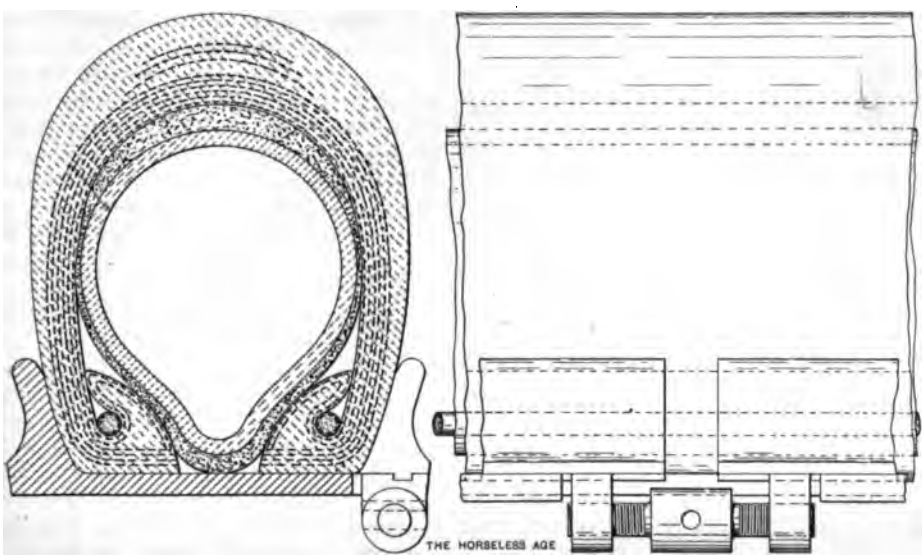


AN UNSAFE "SAFETY" STARTING CRANK.

A new starting crank for gasoline engines which is claimed to be absolutely impossible to "kick back," has recently been brought out in France, and is illustrated herewith. In the drawing, A represents the starting crank proper, which is fixed by a pin to a flanged sleeve, B, to the flange of which is secured the end of a coiled spring, G. The sleeve, B, is free to turn on a shaft, C, to which is pinned the clutch drum, D. On this shaft is also fixed a sleeve, L, which is bored to the same diameter as the projecting end of the motor shaft, and is provided at its end with helicoidal ratchet teeth, F, adapted to engage with a starting pin passing diametrically through the motor shaft. The coiled spring, G, which is made of square-section steel wire, winds around the clutch drum, D, a number of times without touching it, in such a manner as to allow it to turn freely in either direction. Against the spring flange, B, is mounted freely a casing, I, which encloses the entire mechanism. At the extreme right-hand end of the spring, G, there are one or two turns of an enlarged section, which rub against the inside surface of the casing, I, as shown. The operation of the starting crank is as follows:

Normally all the pieces above described are free to turn in both directions, but the enclosing drum, I, being held stationary by a bearing collar, M, if the crank is turned, the end, K, of the spiral spring, which is drawn along by the flange B, rubs against the inner surface of the casing, thereby causing the spring to draw tight on the drum, D, and establishing driving connection with same, as well as with the shaft, C, to which it is pinned; consequently the motor shaft is also put in motion, until an explosion is produced. In that case, the motor shaft traveling faster than the starting crank, the starting pin through the motor shaft moves away from the ratchet teeth F, the crank is disengaged and the motor put in operation. If, on the other hand, a premature explosion should occur in the cylinder, reversing the direction of rotation of the motor, the drum, D, rubbing in the reverse direction against the spires, K, of the spring, opens the spring and disconnects the starting handle from the motor, thus avoiding accidents.

The above description of the action of the device we reproduce from our French contemporary, *L'Automobile*. Upon a close study it will be seen, however, that the clutch is entirely incapable of performing the function it is supposed to accomplish in case of a premature explosion. True, the rotation of the engine in either direction cannot engage the friction clutch, and this is probably what has led the inventor astray, but when the clutch has once been engaged by turning the crank by hand, a back explosion will not disengage it as long as the handle is held by the hand, as the pressure of a premature explosion is in the same direction as the resistance of compression, etc., and therefore only causes the clutch to grip tighter.



NEW PETER DETACHABLE TIRE.

New Peter Detachable Tire.

The accompanying sketch shows the new Peter detachable tire made by the Mitteldeutsche Gummi Waaren Fabrik, Frankfort-on-the-Main, Germany. It is made to fit a rim of special construction, in which one side of the channel is removable and the other made integral with the base. The former takes the form of a spring band, which is prevented from sliding sidewise by a shoulder found on its under side, which fits into a groove running about the edge of the base of the rim. It is drawn tight about the rim by a turnbuckle shown in the view to the right. The outer shoe of the tire itself is made with inwardly turning ends, which fold over against the inner surface of the shoe and form two annular channels, in each of which an endless wire cable fits. These cables tightly hold the tire down onto the base.

To remove the tire the turnbuckle is loosened and the spring band removed from the rim. It is then possible to slide off either one or both sides of the shoe, as desired.

London Motor Omnibuses.

Motor omnibuses have made fitful appearances in the streets of London in the past few years, but at length they seem to have come to stay. Several motor-propelled public conveyances have been put into the regular services of the chief omnibus companies, and have been found to be perfectly satisfactory after trials extending over three or four weeks. The experts who have been closely watching the work of these motor 'buses declare that at last a practical class of vehicle has been found. Both the London Road Car Co. and the London General Omnibus Co. place their faith in steam power, but as oil is used as fuel, the objections of ugliness and noise and smoke are removed. The 'buses are not monstrosities. They run swiftly and smoothly, are trustworthy, and—what is all important—highly popular. In the selection of design and a motive power therefor success appears to have been achieved, although it remains to be seen whether patronage will not seriously fall off when balmy weather returns, for the new conveyances have no outside seats. On the other

hand, the 'buses, being small, are cheap to construct and to run, and for the same reason they can easily twist their way through the traffic, with the result that more journeys per day can be accomplished than with the cumbersome horse-drawn vehicles now in use. It may be, therefore, that the restriction in the carrying capacity will not mean a financial loss to the companies. In the next few days about a dozen more motor 'buses will be plying on populous routes. Another experiment that is being made is with a large 'bus drawn by a gasoline engine. The vehicle is of the conventional London pattern, with outside as well as inside seats. The cost was $5,000, and fully 25 per cent. per annum must be written off for depreciation. The wear of the tires alone represents a cost of 5 cents per mile run, which is just the equivalent of the forage bill of the stud required to work a horse 'bus. Other outlays, however, are small, and so far the proprietors of the vehicle find the innovation a distinctly profitable one.

Police Persecution in France.

At their last meeting the legal commission of the A. C. F. discussed the question which is being so strongly agitated in autocar circles of the persecution of drivers by the police, who have made it a general practice to summon automobilists for alleged furious driving on the sole evidence of their numbers, which, as many motorists have found to their cost, is liable to result in a miscarriage of justice. It is, in fact, rarely possible for a policeman to read the number on a car without risk of mistake, even when the vehicle is running well within the legal limit of speed; but when the cars are traveling so fast as to justify the intervention of the police the difficulties of identifying them increase to such an extent that in quite a large number of cases the summonses are issued against the wrong men. The legal commission, therefore, have drawn up a petition which is to be presented to the authorities, urging that the driver supposed to be exceeding the legal limit of speed should be called upon to stop, and that the summons should only be based upon the number of the car in the event of the driver failing to pull up, while in no case should the number be accepted as the sole means of identifying the car. In other words, the policeman must be able to give a description of the vehicle or obtain evidence from bystanders before an automobilist can be convicted of fast driving. This, of course, is a condemnation of the system of numbering cars, or, rather, it is held that the numbers should merely be taken as a means of strengthening evidence instead of enabling the police to base their summons upon what is often a mere guess at the number when a car is traveling at high speed.

The Auto-Cycle Club of England held a 100 mile trial for tri-cars on November 5. Of the ten starters, six completed the course, which ran through Hatfield, Hertford, Newmarket, Royston and Buntingford. Medals were awarded for fuel economy, hill climbing, ease of starting and control, and brake efficiency, to a 6½ h. p. Pearson, a 4½ h. p. Avonmobile, a 3½ h. p. Wallace, and a 4½ h. p. King. The gasoline consumption was somewhat disappointing for this type of machine, the lowest being 1¾ gallons for the 100 miles, and the highest 2¼ gallons.

In all but one of the competing cars, in which a belt was used, the single driving wheel was driven by a chain.

The Automobile Club of Great Britain and Ireland has made a new departure from its past policy. For some time past manufacturers have held unofficial reliability tests of their cars upon the roads at all kinds of distances. The club has found it impossible to stop these tests, and so it has arrived at the conclusion that it will be best that they should be held under its auspices, and that the performances of the cars shall be hallmarked by the club's sanction and its judges' reports. With this end in view, the technical secretary has drawn up a list of conditions, and any maker or private motorist who cares to subscribe to these will be able to undertake an official reliability test.

The committee of the German Automobile Club has decided to acquire Baron Bleichröder's Palace in the Leipziger platz for its new premises. This palace is one of the finest and most conveniently situated in Berlin. Besides providing ample space for reception rooms and offices, it has outhouses admirably suited for the purposes of garage. The Emperor is very much interested in the club, and has initiated the forthcoming automobile exhibition.

The Stanley Show was opened by Sir A. K. Rollit, M. P., on November 18, in Agricultural Hall, London. This is the twenty-eighth annual show of the Stanley Cycling Club, and, although originally a bicycle show pure and simple, has come to be regarded as one of the events in the automobile world. The exhibits this year, outside of bicycles, consists chiefly of motor cycles and tri-cars. Comparatively few large cars are shown.

Five years have elapsed since the introduction of motor cars into India, and there are now about 150 in the country, mainly in a few of the larger towns and in the capitals of some native states. The practical advantages to be derived from automobiles are as yet by no means appreciated. The chief reason for this is the lack of mechanics, drivers and repairing shops.

Prevention of Dust on Highways.

During the past summer the western section of the Scottish Automobile Club conducted experiments in the prevention of dust on roads by the use of westrumite and crude oil.

Two stretches of roadway were selected, about half a mile in each place being treated, in which the metaling was in three stages of wear. Half a ton of westrumite was used in each case. Previous to the first application the road was cleaned and swept, then a 10 per cent. solution was applied by means of ordinary watering carts. Three days later another 10 per cent. solution was applied, but within a few hours of the second application a torrential rain, which washed away a considerable portion of the mixture, fell over the district; consequently a third 10 per cent. mixture was applied, instead of two successive applications of 5 per cent., as was originally intended.

Crude oil was used over a stretch of road comprising metaling at two stages of wear. The road surface was swept clean and the oil poured on by means of cans, and brushed over so as to saturate the surface uniformly.

In a report on the results the secretary of the club says, in substance:

In about twelve hours after the application the road surface was dry enough in each case to take the traffic, and not a single complaint of damage done to tires or paint of any vehicle thereby has been made. In the case of westrumite, for several weeks there was absolutely no dust raised by vehicles of any description passing over the road, and even three months afterward there was but little dust. On the older portions, where the metal is much worn, the tendency to dust is greater than elsewhere. As to the crude oil experiment, the results obtained from the different stages of wear of road surface are not so noticeable. This material is more effective, but for the first week or ten days after its application, especially if wet weather prevails, it is not so clean as the westrumite; neither is it so easily applied nor so clean to handle. There is one point in its favor—one application suffices for a season. With the westrumite several applications are necessary, at intervals varying according to the nature of the weather and the condition of the road. The experiments have been so far successful, and have demonstrated the efficiency of the materials used for the purposes of dust prevention. The cost to the club has been approximately $100 per mile, which may be accepted as a fair average of the cost of this method of road dressing. For long stretches of road in the country the cost of the application might make its general use prohibitive, but in villages or populous places or residential districts the complete absence of dust in dry weather would be appreciated, and would be well worth the expenditure required.—Rufus Fleming, Consul, Edinburgh, Scotland, October 14, 1904.

Club Notes

SAN ANTONIO A. C.

The club is reported to be in a prosperous condition. The membership has now reached nearly a hundred.

MILWAUKEE, A. C.

A meeting of the club was held at the Hotel Pfister last week at which two papers were read on "Anti-freezing Solutions." Arrangements have been made for a series of meetings through the winter at which papers will be read on subjects pertaining to the construction and care of motor cars.

NEWTON (MASS.) A. C.

The first annual banquet of the club was held on Thursday evening, December 1, President Ferris presiding. Among the guests and speakers of the evening were Messrs. Harlan W. Whipple, president of the A. A. A.; Elliot C. Lea, president of the Massachusetts A. C.; Alexander Winton, of Cleveland; Harry Fosdick, of Boston, and Hon. Samuel L. Powers. The question of favorable legislation was discussed at some length.

BUFFALO A. C.

At the regular monthly meeting of the club held on December 1, Mr. A. H. Knoll was nominated for the presidency in the place of William H. Hotchkiss, resigned. Other nominations were: A. H. Meldrum, vice president; D. H. Lewis, secretary; Col. Charles Clifton, treasurer. For the board of governors the following were named: Messrs. E. R. Thomas, E. H. Butler and W. H. Baker. The election is to take place on Monday, December 19.

LONG ISLAND A. C.

At a regular meeting of the club held at the club house on Sunday evening the revised constitution and bylaws were adopted. They provide for an increase in the number of governors from seven to ten, three being newly elected each year to serve a three year term.

After this year the annual election will take place on the first Wednesday in December, instead of the third as heretofore. This year's dinner, election and entertainment will take place on Wednesday, December 21. A number of well known city officials have been invited to attend.

A. C. OF N. J.

The Automobile Club of New Jersey entertained visiting motorists at a smoker held on Wednesday evening at the club quarters. There were present several prominent motorists, who had come to witness or take part in the hill-climbing contest. The club members and others who were officials of the contest were tendered a luncheon by Mr. Whipple on Thursday, at the Orange Club. During the afternoon a new model White steam carriage was presented to Mr. W. E. Scarritt, former president of the A. C. A., by several of his friends. Mr. John A. Hill made the presentation speech.

CHICAGO A. C.

At a meeting of the directors of the club, held on November 28, the secretary was directed to notify all club members that it is the desire of the directors that they refrain from trying to break records or exceeding the speed limit without consent of the municipal authorities.

A. M. L.

An active revival of the league has been inaugurated. Communications have been sent all over the country requesting information as to routes in the principal States, and the compilation of this matter into usable form has been commenced. Two books comprising routes in Northeastern New Jersey, Long Island and the region south of Poughkeepsie are ready for the press, and outline maps have been prepared covering important automobile routes in New York, New Jersey, Pennsylvania, Massachusetts, Connecticut, Ohio, Illinois, Indiana, Iowa and Michigan.

ST. LOUIS A. C.

The club has decided to issue certificates to duly qualified chauffeurs. A board of examiners will investigate the credentials and fitness of applicants, and will issue certificates to such as they deem worthy. The certificate will read as follows: "This is to certify that Mr. John Smith has been examined by a committee of the club, and that he is duly qualified to act as an operator. His personal habits and character are good." It is signed by the president of the club and the committee. The system is to be used merely for the benefit of club members, the holding of such certificate being taken as absolute recommendation of any man to a member of the club.

A. C. A.

On Tuesday evening, November 29, F. G. Gilman, Ph. D., who has toured extensively in England, gave an illustrated lecture at the club on "Automobile Touring in England." It is announced that Magistrate Crane will address the club on the evening of December 13, on the subject "The Automobile and the Magistrate." The board of governors has elected Mr. Emerson Brooks treasurer for the coming year in place of Mr. S. H. Valentine, recently elected, who is about to go abroad. Mr. Scarritt, the retiring president, has been elected a governor in place of Mr. Morris, the new president. The club has decided to issue a new series of maps, the plates of the old ones having been destroyed by fire. Members have been requested to send full descriptions of any good routes in the territory covered by the old maps, as well as in the sections north and south of the Central New Jersey section, and any necessary changes in the old routes. The maps of Southern and Northern New Jersey, now in preparation, will probably be issued on or about May 1 next.

NEW YORK MOTOR CLUB.

The nominating committee has presented the following list of candidates for election at the first annual meeting on Thursday, December 8: President, S. A. Miles; first vice president, Charles H. Hyde; second vice president, W. J. P. Moore; treasurer, Q. L. McMurtry; secretary, Louis R. Smith; directors, Angus Sinclair, F. J. Griffin, Joseph Caman, Col. J. C. Pardee. An opposition ticket exchanges the names of Messrs. Miles and Hyde for the first two places, substitutes that of Joseph Caman for that of Louis R. Smith, candidate for secretary, and replaces the names of Angus Sinclair and Joseph Caman, directors, with those of J. D. Price and B. M. Shanley. The club has taken permanent quarters at Bretton Hall, Eighty-sixth street and the Boulevard, where a suite of rooms has been engaged. An entertainment has been arranged for the evening of the election. The feature will be a series of moving pictures of the principal automobile events of the year, including the Vanderbilt Cup race, Mount Washington Hill Climbing contest, the Gordon-Bennett race, Circuit des Ardennes and others.

A Correction.

On page 522 of our issue of November 23 in the article "Transmission Gears—Safe Working Stress," by Thos. J. Fay, E. E., certain typographical errors appeared.

The formula

$$S = \frac{4000}{\sqrt{1 + 0.50\,V}}$$

should have been

$$S = \frac{40{,}000}{\sqrt{1 + 0.5\,V}}$$

In the example of the same formula

$$1 + \frac{4000}{\sqrt{0.5 \times 942}}$$

should read

$$S = \frac{40{,}000}{\sqrt{1 + 0.5 \times 942}}$$

and the example

$$P = \frac{38.6 \times 33{,}000}{6.28 \times 100} = 202$$

should have been

$$P = \frac{38.6 \times 33{,}000}{6.28 \times 1000}$$

Out-of-town subscribers of The Horseless Age, who intend visiting the New York Automobile Show, are requested to communicate with the Editor, if possible mentioning the name of the hotel at which they will stop when in the city.

LEGISLATIVE AND LEGAL.

The New Law Pending in Vermont.

The so-called Campbell act is now before the Legislature of Vermont. It requires that all automobiles be registered with the Secretary of State by their owners, that they carry numbers at least 4 inches high, and that all operators be licensed. The speed limit is placed at 10 miles an hour within the limits of cities or thickly settled districts and at 15 miles an hour in the open country. The Secretary of State is given the power to revoke any operating license or registration certificate for any cause which he may deem sufficient, after due hearing. The penalties consist of fines of not less than $25 nor more than $50 for the first offense, and not less than $100 or an imprisonment for a term of ten days at the discretion of the court for second and subsequent offenses.

Section 7 is especially interesting to automobilists, and is given here in part:

"Upon all highways outside of city or village or thickly settled portion of a town or fire district the operator of such automobile or motor vehicle shall stop said automobile or motor vehicle not less than 75 feet from any approaching vehicle drawn by a horse or horses, or a horse upon which any person is riding, and shall not proceed farther until such driver or rider of such horse or horses shall have passed said automobile or motor vehicle or have reached a place of safety, unless such rider or driver of such horse or horses shall signal the person having in charge such automobile or motor vehicle to advance."

Section 14 states that nothing in the bill shall be so construed as to affect the rights of city, town or village officials to make special regulations as to the speed of automobiles in their own section or to exclude them altogether from certain roads or ways therein. Such exclusion, however, shall be subject to an appeal to the Secretary of State, whose decision in the case shall be final. No such special regulation shall be effective unless notice of the same is posted conspicuously at the points where any road affected thereby joins other roads.

The bill has been reported favorably with amendments and will probably come up for another reading soon.

CHICAGO, Ill.—William McClintock and George C. Wilson have been sued for $20,000 damages by Samuel F. Rippey, who claims to have suffered a dislocation of the shoulder and other injuries when thrown from a buggy, which was struck by an automobile in which the defendants were riding.

Owosso, Mich.—The State Association of Farmers' Clubs is endeavoring to secure the passage at the coming session of the Legislature of a State law restricting the use of automobiles on the public highways.

ST. PAUL, Minn.—Samuel J. Joy has brought suit against Mrs. E. C. Holden for $170, alleging that she refused to accept delivery of a car which she had ordered and toward the payment of which she had advanced $100. The amount sued for is said to be the excess of the commission which would have been received had the sale been completed over the amount deposited.

NEW YORK, N. Y.—Experiments conducted by certain members of the Automobile Club of America, in timing horse drawn vehicles over stretches of Fifth avenue and Riverside drive, are said to have shown that the highest rate of such vehicles is 22 miles per hour and the minimum 8 miles per hour. During the same period 106 automobiles were timed over the same course, and they showed an average speed of 16 miles an hour.

HARTFORD, CONN.—Automobile owners will endeavor to secure a law which will impose a penalty upon persons who take an automobile without the permission of the owner. The present law states that "every person who shall willfully take and use the horse, boat or bicycle of another, without his permission," shall be fined, but no provision is made to cover motor cars.

STEPHEN, Minn.—A jury has disagreed in the case of J. P. Nelson vs. Ed. Russell. The complaint stated that the plaintiff was severely injured when his horse took fright at a motor car driven by the defendant. Ten thousand dollars damages were asked. A new trial has been ordered.

WOODBURY, N. J.—Rev. W. S. Mitchell, of Hurffville, has sued B. W. Cloud for $20,000 damages for severe injuries resulting from an accident some months ago, when the plaintiff's horse became frightened at Cloud's automobile.

INDIANAPOLIS, IND.—It is probable that the farmers will demand the passage of an automobile law at the coming session of the Legislature. They are taking steps to that end at the present time.

EAU CLAIR, WIS.—An ordinance has been passed which regulates the speed of automobiles to 6 miles an hour in the business portion of the town and 10 miles an hour outside. It also states that due caution must be exercised at all times not to injure persons or frighten horses on the highway. The penalties for violation are fines of from $5 to $20.

NASHVILLE, TENN.—The motorists who have not as yet complied with the new ordinance and accordingly registered their cars with the recorder, will be arrested, it is announced, by the police, if they are caught operating their machines on the streets of the city. Seventy-three owners have already registered.

CHICAGO, ILL.—It has been decided that the injunction which Judge Hanecy granted several months ago to President Farson and some two hundred members of the Chicago Automobile Club (restraining the city from enforcing the city automobile ordinance against them) is active against the park board as well as all other city authorities. As a result the recently made regulations of the park board regarding the identification of automobilists who use the parks by photographs attached to their permits, the blowing of horns, etc., cannot be enforced against them.

PATERSON, N. J.—Of late motorists have been stopped frequently on the Newark-Paterson road by two men, claiming to be constables, who lead them off into the woods before a third, who is sitting on an improvised bench, made from a soap box. The "magistrate" invariably fines the victim $10. In every case the fine was paid in preference, it was thought, to being hailed to Belleville or Newark for trial. It is supposed that the trio are a band of "sharps," as nothing definitely can be learned concerning them. Automobilists of the section are investigating.

DENVER, Col.—Alderman James Maloney has announced that he will endeavor to secure the passage of an ordinance which will provide for the appointment of an automobile inspector and a heavy license fee for all operators.

ST. LOUIS.—Deputy Sheriff Joseph Eilers, on December 1, levied upon eight automobiles under a replevin suit brought by Augustus B. Stoughton against the World's Fair Automobile Transit Company. The amount involved in the suit is said to be about $14,000.

Gordon Bennett Cup Race.

At the time of writing no entries have been made for the Gordon Bennett Cup team trials. Entries for American nominations close on December 15. Clarence Gray Dinsmore will act as the official representative of the Automobile Club of America at the race, and also at the conference which is to be held in the rooms of the Automobile Club of France on December 10 to decide upon the date for the race and the rules and conditions under which it will be run. It is proposed to increase the length of the race from 300 to 600 miles, and to reduce the maximum weight for contesting cars from 1,000 to 800 kilograms. A suggestion which will be discussed is that a limit be placed on the number of spare tires carried in each car, and it is also proposed that the winning of the cup be decided on a basis of team performance instead of individual records as heretofore.

Out-of-town subscribers of The Horseless Age, who intend visiting the New York Automobile Show, are requested to communicate with the Editor, if possible mentioning the name of the hotel at which they will stop when in the city.

Commercial Vehicle Notes.

An automobile passenger transportation line is contemplated in Bay City, Mich., to compete with the street railway.

Waggoner & Sons, of Independence, Kan., have recently put an automobile 'bus in service on the streets of that town.

Averill & Gregory, proprietors of the Yates House, of Syracuse, N. Y., have purchased four electric 'buses, which they will use to transport baggage and passengers between the hotel and railroad stations.

It is estimated that the motor line which is to be established between Sioux Falls, S. Dak., and the Black Hills will shorten the present rail route between those points by nearly 800 miles, as communication is now had by way of Sioux City or Omaha only.

An automobile line is projected to run from Falmouth, Mass., to connect with the Middleboro, Wareham and Buzzard's Bay Street Railway at its terminus at Monument Beach. It is planned to form a company with $50,000 to carry the scheme through.

It is reported that the city of Chicago is about to purchase a number of motor vehicles of various descriptions for use in the various municipal departments. One machine is to be for the use of the fire alarm repair gang, and another for police patrol service.

A trackless trolley car will be put in operation in the vicinity of Salamanca, N. Y., in the coming spring by the Salamanca Electric Traffic Company. It is equipped with a storage battery and also with a double trolley pole, which takes current from two wires overhead.

The San Joaquin Valley and Coast Transportation Company has been incorporated in Los Angeles, Cal. with a capital of $100,000, for the purpose of establishing an automobile stage line across the State. The directors are A. D. Laughlin, J. H. Wilmans, T. Forster, L. K. Chase and M. Hopkins, all of Los Angeles.

There is talk of an automobile stage line between Torrington and Terryville, Conn., to connect with electric lines at Terryville for Hartford. The company considering the plan now holds a franchise for an electric line between these two points, and is considering the use of automobiles instead. The present railroad fare between Hartford and Torrington is $1.15. The fare over the proposed line, including the existing electric connections, it is said, will be 50 cents.

Through an error in our printing department a cut showing a solid tire was used with the advertisement of the Diamond Rubber Company in our issue of November 30. The text refers to the company's 1905 product and it might be inferred from the cut that this is to be a solid tire instead of the detachable type to which the advertisement calls attention.

New Incorporations.

Syracuse Motor Car Company, Syracuse. Capital, $20,000. Incorporators, David Grady, Simon Silverman, Jr., W. H. Bissell.

National Automobile Company, Jersey City, N. J. Capital, $250,000. Incorporators, Louis B. Dailey, H. C. Coughlan, B. Stafford Mantz.

Union Motor Supply Company, New York city. Capital, $25,000. Incorporators, Rene E. Jarrige, Jesse J. Bietler, Frederick de Turckheim.

Flint Auto Brass and Aluminum Company, Flint, Mich. To manufacture brass, aluminum and other metal castings for automobiles. Capital, $25,000. Officers: James W. Hines, president; J. George Snyder, vice president; Thomas D. Buick, secretary, and Bert J. Smith, treasurer.

Troy Automobile Exchange, Troy, N. Y. Capital, $5,000. Directors, James Lucey, Victoria L. Lucey, Cornelius Lucey.

Rapid Motor Vehicle Company, Detroit, Mich. Capital, $100,000.

Harrolds Motor Car Company, New York city. Capital, $90,000. Directors, E. J. Steiner, Edward Brand, Harry Unwin.

The D. E. Mars Electric Vehicle Company, Cleveland, Ohio. Capital, $2,500. Incorporators, W. O. De Mars, Charles W. Baker, John R. Beakesley, Jr., H. J. Gibbons, L. M. Barnes.

Trade Literature Received.

C. E. Smith, 933 High street, Fall River, Mass.—Circular regarding the Smith chain clamp.

The James Brown Machine Company, Pawtucket, R. I.—Advance circular of the Cameron cars.

Elmore Manufacturing Company, Clyde, Ohio.—Folder giving advance information regarding their 1905 cars.

Weston-Mott Company, Utica, N. Y.—"Automobile Specialties," being a pamphlet devoted to a description of the rims, steering knuckles and axles manufactured by this company.

Uniform Garage Rates.

The New York Automobile Trade Association has adopted a uniform schedule of charges for the storage and care of cars, to go into effect on January 1. Thereafter the storage rate for large cars of the regular touring class will be $25 a month and for small tonneau cars $20 a month. For runabouts, with seats for two, the rate will be $15, while transient storage will be $1.50 a day. These charges will include washing and cleaning. Certain recommendations were made by the committee in charge of the matter regarding minimum prices for gasoline and lubricating oil. The rate for cylinder oil will be fixed at not less than 80 cents a gallon and that for ordinary lubricating oil at 40 cents a gallon.

Disastrous Garage Fire.

The garage and repair department of the Standard Automobile Company, 140 to 148 West Thirty-ninth street, was destroyed by fire on Monday, December 5.

The fire occurred at half-past 12, while most of the employees were at lunch. A tank wagon was backed in on the floor for the purpose of filling the underground storage tank, when the fluid caught fire. The burst of flame was so sudden and overwhelming that there was no opportunity to save any of the property in the building.

The repair shop and stock rooms, which were on the second floor, were completely gutted.

The Standard Co. carried a heavy stock of parts, and this, together with their machine shop, is almost a total loss. On the main floor were some twenty-five cars belonging to customers, all of which are seriously injured. The damage appears at first sight, however, to be mainly to the upper parts of the cars, as several of those standing in the front of the station have their tires still intact and appear to be only badly singed, and not beyond repair.

The cause of the fire is only to be conjectured at present. It is admitted by employees of the company that although the gasoline supply was kept underground it was pumped into an oil room in one corner of the main floor, and that this room was separated from the floor by a thin wooden partition which was not armored. The forge of the repair shop was directly above the oil room, and it is said that the floor was unprotected. The blacksmith was at work at the time the fire occurred.

Although there were but one or two men on the main floor, five or six mechanics were at work in the shop, and these being cut off from the stairway were forced to jump from the windows. Two of them suffered broken legs and the others were all more or less bruised.

The loss is variously estimated at from $30,000 to $70,000. The Standard Company was insured as to stock and fixtures, and many of the private owners had their cars insured also. The net loss, including the small losses of mechanics' and chauffeurs' tools and clothing, will be well up in five figures.

Changes in the Conduct of Florida Races.

A number of changes have been made in regard to the conduct of the speed trials at Ormond-Daytona, Fla., by the Florida East Coast Automobile Association, under whose auspices the events are held. In future all contests will start and finish at Daytona. It has been decided to hold two tournaments each instead of one, and to have entries close with the secretary of the association at Daytona. Entries for the coming contest, January 23 to 28, will close, therefore, with J. B. Parkinson, Daytona, Fla., on January 10.

MINOR MENTION

Dr. J. E. Taggart and others are opening a garage at Burlington, Vt.

Mrs. Howard Gould has offered a cup for a 100 mile race at the Ormonde meet.

A company is being organized in York City, Pa., to manufacture automobiles.

Automobilists of Palmer, Mass., are considering the question of organizing a club.

William J. Reid, of Aurora, Ill., is erecting a garage on La Salle street, in that city.

George M. Beringer, Camden, N. J., is putting out an anti-freezing solution for cooling systems.

A program of automobile gymkhana races was run off at the Pasadena, Cal., Country Club on November 27.

Janney, Steinmetz & Co., of Philadelphia, have removed their offices to the northwest corner of Fourth and Market streets.

George B. Adams has been appointed New York agent for the Corbin Motor Vehicle Company, if New Britain, Conn.

The Snell Motor Car Truck Company, of Toledo, have changed their name to the American Motor Car Truck Company.

The J. S. Leggett Automobile Company, of Syracuse, N. Y., are negotiating for a factory site in the neighborhood of Buffalo.

The Sterling Manufacturing Company, of Fall River, Mass., have taken the agency of the Locomobile Company of America in that vicinity.

The Standard Wheel Company, of Terre Haute, Ind., are building a four cylinder touring car, which they will market during the coming year.

James Donahue, of Providence, R. I., was instantly killed last week when a automobile, in which he was riding, crashed into a telegraph pole.

The Harrolds Motor Car Company, of New York city, have secured quarters in the Journal Building at Broadway and Fifty-eighth street.

L. A. Howell will have charge of the New York city sales office of the Rea Car Company, of Lansing, Mich., at 138 West Thirty-eighth street.

The Riding and Driving Club, of Brooklyn, N. Y., has taken preliminary steps toward the erection of a large garage in its Park Plaza property.

The firm of Deyler & Levy has been organized in Chicago to handle the Autocar agency. They will occupy quarters at 390 Wabash avenue.

Henry Sanderson has retired as president of the New York Transportation Company, the electric cab concern, and has been succeeded by R. W. Meade.

The E. R. Thomas Motor Company, of Buffalo, will handle their own retail business in 1905. Calvin T. Paxon has been appointed sales manager.

A bottle of seltzer, secured from a saloon near at hand, was the means of saving an automobile from destruction by fire in Los Angeles, Cal., recently.

The Buick Motor Company, of Flint, Mich., having purchased the license of the Pope-Robinson Company, of Hyde Park, Mass., are now members of the A. L. A. M.

The Perry-Payne Company, of Cleveland, are to erect a structure on Oregon street, between Muirson and Erie streets, to be used as garages and automobile repair shops.

The automobile radiators and parts business of W. J. Kells has been taken over by the W. J. Kells Manufacturing Company. Mr. Kells will be identified with the concern.

Hyslop Brothers, of Toronto, have taken the Canadian agency for Darracq cars. This is said to be the first Canadian agency established by a French automobile firm.

A judgment awarding $300 damages to the purchaser of an automobile in a case in which the delivery had been unduly delayed by the manufacturer was secured recently in a French court.

The Motor Vehicle Company, of Louisville, Ky., have made an assignment. A statement of the assets and liabilities cannot be given at this time, but it is said they are about equal.

Work has been started on a second story addition to the plant of the Packard Motor Car Company, of Detroit, Mich., which will provide increased floor space, amounting to about 19,000 square feet.

The Grout Brothers Automobile Company, of Orange, Mass., will market a side entrance tonneau steam car during 1905, equipped with a new burner, horizontal engine and side chain drive.

The Selden patent license of Edward B. Gallagher, American agent for Richard-Brazin cars, has been revoked because of his failure to pay royalties under the contract with the Electric Vehicle Company.

Cortlandt Field Bishop, of Lenox, Mass., has placed the road signs of the Automobile Club of America from Russell to East Lee, indicating the best automobile route from the Westfield River to the Housatonic Valley.

The Stanley Motor Carriage Company, of Newton, Mass., have appointed the following new agents: R. R. Kimball, Omaha, Neb.; Edwin E. Sweeney, Nashville, Tenn., and White Automobile Company, Columbus, Ohio.

The automobile importers in New York are urging upon the custom house officials the investigation of the importation of alleged second hand cars, which are entered at a low valuation and later put together and painted and sold for new cars.

The American Motive Power Company has been incorporated in New Haven, Conn., with a capital stock of $100,000, to manufacture gas and gasoline engines from designs by J. J. Hogan. The company has the right, under its charter, to make automobiles.

A proposition has been made to hold an international hill climbing contest over the De Soto Road through the Ozark Mountains, starting from St. Louis. The road provides a series of steep grades of varying steepness for a distance of 45 miles.

On the petition of Alfred D. Hitz, a stockholder, Judge Allen, of the Circuit Court, has appointed James L. Barrett receiver for the Capital Automobile Company, of Indianapolis, Ind. Hitz alleged that the concern is insolvent and stated that it is indebted to him $3,000.

The Virginia Automobile Company, of Norfolk, has applied for a charter. They are to manufacture and sell cars. The officers are Moses G. Nusbaum, president; James W. McCarrick, vice president; J Roy Collins, secretary, and J. J. Hennelly, treasurer.

The Dover Garage Company, incorporated in Dover, N. J., recently, with a capital stock of $10,000, have taken quarters on East Blackwell street. The officers of the company are: R. A. Bennett, president; Charles E. Clark, secretary and treasurer; H. P. Hall, manager.

The Florida agency for Cameron cars has been secured by G. R. Champlain, of Jacksonville. Other agencies recently established by the James Brown Machine Company, of Pawtucket, R. I., are with P. H. Johnston & Co., Newark, N. J., and Charles Rockliff Motor Car Company, Brooklyn, N. Y.

The Motor Car Equipment Company, recently organized, will take over the business of Emil Grossman and will be located at 43 Cortlandt street, New York city. Mr. Grossman is president of the new company. Julius Silverman is vice president and Carl Kaufman secretary and treasurer. The company will have a branch at 1645 Broadway.

The Mitchell Motor Car Company, of Racine, Wis., has established the following new agencies: P. H. Greer, Third and Los Angeles streets, Los Angeles, Cal.; George Bailey, 312 Wells street, Milwaukee, Wis.; H. L. Hall, 150 Michigan avenue, Chicago, Ill.; Twin City Automobile Company, Minneapolis, Minn.; Westminster Automobile Company, St. Louis, Mo.; Robert Smythe, Rock Island, Ill.; R. P. Bayly & Co., 1052 St. Charles avenue, New Orleans, La.; F. Somellera y Bermejillo, Mexico City, Mex.

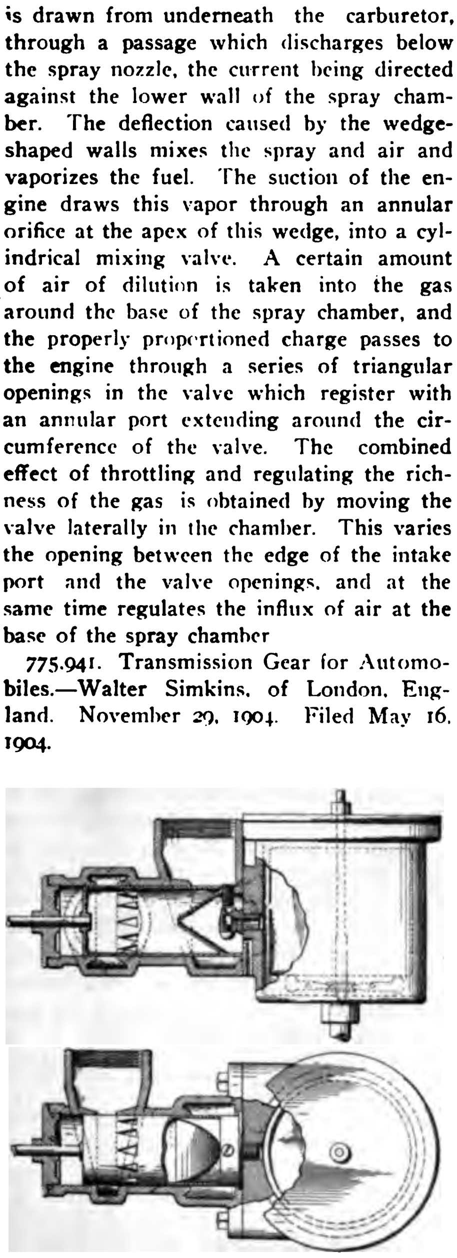
An order has been secured in the Court of Chancery directing that the Plainfield (N. J.) Auto Garage Company show cause before the Chancellor at the State House, December 6, why an injunction should not be issued and a receiver appointed to take charge of all of their property. The complaint is made by Andrew H. Wilson, of North Plainfield, who claims that he owns five shares of the capital stock of the company, and that the company is indebted to him for moneys loaned in the sum of $1,467.75.

MOTOR VEHICLE PATENTS..

United States Patents.

775,553. Carburetor for Hydrocarbon Engine.—George W. Burton and Alfred F. Geibel, of Toledo, Ohio, November 22, 1904. Filed May 28, 1904. This patent embodies claims for an arrangement of parts whereby a constant mixture is supplied under all conditions. The gasolene is supplied to the mixing jet from a float chamber of conventional form. The spray nozzle consists of a cup-shaped orifice directly opposed by an adjustable screw, whose position regulates the amount of flow from the orifice. The spray impinges upon the upper wall of a wedge-shaped spray chamber, the air used in vaporizing the fuel is drawn from underneath the carburetor, through a passage which discharges below the spray nozzle, the current being directed against the lower wall of the spray chamber. The deflection caused by the wedge-shaped walls mixes the spray and air and vaporizes the fuel. The suction of the engine draws this vapor through an annular orifice at the apex of this wedge, into a cylindrical mixing valve. A certain amount of air of dilution is taken into the gas around the base of the spray chamber, and the properly proportioned charge passes to the engine through a series of triangular openings in the valve which register with an annular port extending around the circumference of the valve. The combined effect of throttling and regulating the richness of the gas is obtained by moving the valve laterally in the chamber. This varies the opening between the edge of the intake port and the valve openings, and at the same time regulates the influx of air at the base of the spray chamber

775.941. Transmission Gear for Automobiles.—Walter Simkins, of London, England. November 29, 1904. Filed May 16, 1904.



No. 775,553.

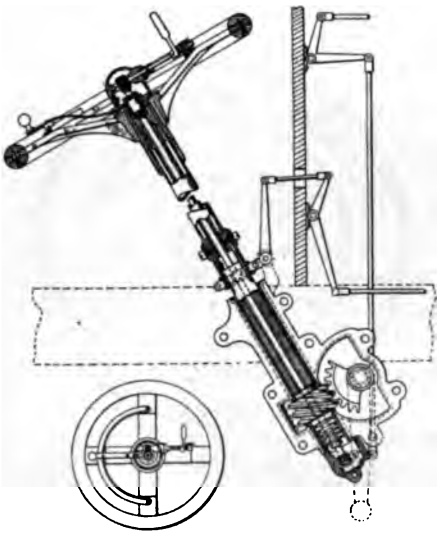
A belt pulley attached to the driving wheel of an automobile, has a belt of slightly yielding material passed around it and fastened end to end. A series of gear teeth are fastened to the belt, spaced to mesh with the driving chain of the machine. When the load is suddenly applied a slipping occurs between the pulley and belt, thus relieving the mechanism of undue strain.

775,909. Method of Treating Roads to Allay Dust.—Harold Bently Anderson, of Cleveland, Ohio. November 29, 1904. Filed July 23, 1904.

The treatment consists in spraying the roadway with an emulsion of oil and some volatile agent, which will ultimately evaporate, leaving the oil distributed over the surface in finely divided particles.

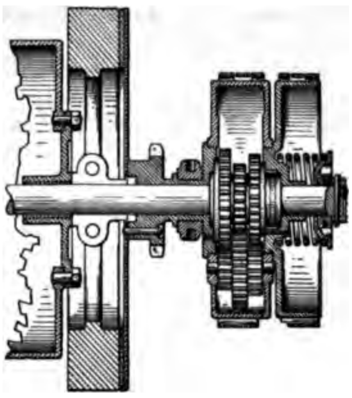
775,991. Steering Gear and Motor Controlling Mechanism for Motor Vehicles.—Charles Schmidt, of Detroit, Mich. November 29, 1904. Filed March 21, 1904.

This is the combination of an ordinary



No. 775,991.

steering gear, comprising worm and segmental gears, a tubular steering post, and hand wheel, with means of actuating the engine throttle and spark timing gear, by means of levers mounted in the wheel. The throttling mechanism consists of a reciprocating rod, centrally mounted within the steering post, and having a circular rack at either end. That at the lower end meshes with a pinion mounted on a rocker shaft linked to the throttle. The upper rack is engaged with a pinion mounted on a rocker shaft carried in the steering wheel, and having a finger piece or operating handle conveniently located upon it. Two notched collars, one affixed to the shaft and the other rigid with the pinion housing, serve as a detent, being held in mesh by a spiral spring acting along the axis of the shaft. The spark advance is by means of a tubular rod, also mounted within the steering post and surrounding the reciprocating rod of the throttle control. A sliding sleeve upon the outside of the steering post is connected with this by means of two pins



No. 776,134.

running in slots in the post and serving to guide the rod and sleeve, and prevent them from rotating except with the post. The spark timer is connected to this by means of linkage and a yoke which rides in a suitable groove in its face.

The upper end of the tubular rod is coarsely threaded to receive a nut swiveled in the hand wheel. A lever, whose outer end traverses a notched section, is fastened to this, and serves to actuate the mechanism. The feature of circular rack on the throttle control and sliding collar and yoke on the spark timer permit the rotation of the steering gear without in any wise affecting the adjustment of those functions.

No. 776,134. Speed Controlling Mechanism for Automobiles and the Like.—Robert H. Hassler, of Indianapolis, Ind. November 29, 1904. Filed June 13, 1904.

This is a form of semi-planetary transmission in which the normal drive is by means of a leather faced disk held in contact with the flywheel by a spiral spring mounted on the driving shaft at the outer end of the mechanism. The action is controlled by means of a yoke and linkwork connected with a hand lever, so that the gearing may be slid endwise along the shaft to engage or disengage the clutch. The clutch disk is mounted on a sleeve adapted to run loosely on the shaft. A driving sprocket is keyed to this sleeve and to it is also fastened a gear. Side by side with this gear are two others, separated by ball bearings, the one splined to the driving shaft and the other fastened to a drum which rides freely upon the main shaft.

Three gears formed integral with one another, and meshed with the three already described are mounted on a countershaft which is carried by a second drum. This drum, which controls the hill climbing speed, rides loosely upon a flange of the sprocket sleeve, and a flange of the first mentioned drum, which controls the reverse action. The two drums are surrounded by brake bands by means of which their rotation may be controlled through the medium of two foot pedals.

The effect of locking the slow speed drum is to drive the sprocket sleeve through its own gear and two of the countershaft gears from the gear which is

splined to the crank shaft. The reverse drum meanwhile spins idly.

The stopping of the reverse drum causes the driving effort to be transmitted from the crank shaft to the countershaft, and to the gear upon the reverse drum, which is now stationary. The countershaft gears then become planetary with respect to this, and a reverse movement of the low speed drum, the third countershaft gear likewise rolling about the sprocket sleeve gear. But, owing to a difference in the diameter of the extreme countershaft gears, a differential effect is produced which drives the sprocket sleeve in a reverse direction also.

776,035. Tire.—Walter Stokes, of New York, N. Y. November 29, 1904. Filed August 27, 1904.

This is a non-puncturable, non-skidding covering for a pneumatic tire. It consists of a series of "convexo-concave" steel plates, arranged within the outer casing in such a manner as to "break joints," and fastened to it by bolts which project through the outer surface sufficiently to form a non-skidding tread. The covering, which may be of any suitably resilient material, is secured to the tire proper by a vulcanizing process.

No. 776,047. Tire Rim.—Charles G. Fawkes, of Denver, Col. November 29, 1904. Filed January 15, 1904.

This device consists of a two part rim, one half of which, consisting of a base and one flange, is permanently affixed to the wheel, while the other portion—which has the same sectional form—is adapted to fit over it. The two are held together and in position by a series of bolts which embrace the felly, the two sections of the rim, and, entering the tire, are threaded into lugs which are embodied in its structure.

No. 776,023. Motor and Frame Therefor for Motor Vehicles.—Norman T. Harrington, of Detroit, Mich. November 29, 1904. Filed March 21, 1904.

This patent is on the arrangement and combination of a horizontal motor with cylinder lying toward the front of the vehicle, and crank shaft at the centre of oscillation of the rear spring arms, so that the driving chain will have a uniform tension for all conditions of spring deflection. The main bearings and caps are set in oblique slots in the combined crank case and frame, at an angle in line with the stresses due to chain load and connecting rod effort—the motor being set to run under during the working stroke. The cap blocks are set down and adjusted by means of wedge keys which pass through the casing and caps, and are held in place by nuts upon their projecting ends. The frame is supported by lugs upon the vehicle frame, and serves to stiffen and brace it against undue stresses.

12,284. (Reissue.) Change-Speed Gearing. Louis P. Mooers, Cleveland, Ohio. Nov. 15, 1904. Filed Sept. 24, 1904. Original No. 737,442, dated Aug. 25, 1903.

37,232. (Design Patent.) Automobile Body.—Daniel P. Sammis, Bayonne, N. J. Nov. 15, 1904. Filed March 26, 1902.

775,824. Pneumatic Tire.—Frederick R. Keith, Randolph, Mass. November 22. Filed February 13, 1904.

775,831. Vehicle Wheel.—John Lefler, San Bernardino, Cal. November 22. Filed March 21, 1904.

775,860. Means for Cooling Heated Surfaces.—James H. Sager and George D. Green, Rochester, N. Y. November 22. Filed October 14, 1902.

775,908. Speed Regulator for Explosive Engines.—John S. Losch, Pottsville, Pa. November 22. Filed May 28, 1902.

775,932. Sparking Igniter Device for Hydrocarbon Engines.—James W. Packard,

No. 776,035.

Warren, Ohio. November 29, 1904. Filed June 27, 1903.

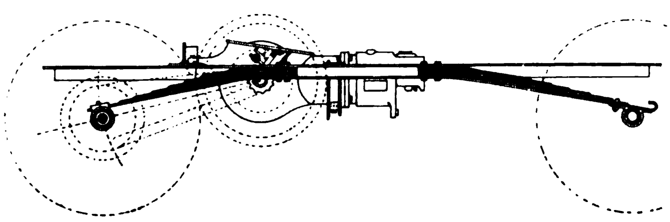
775,979. Hub for Wheels.—Maurice Lachman, London, England. November 29, 1904. Filed April 2, 1904.

775,999. Automobile Headlight Cover.—Harry S. Tompkins, Newark, N. J. November 29, 1904. Filed February 8, 1904.

776,015. Door and Seat Lock Mechanism for Automobiles.—Edward L. Egermayer, N. Dak. November 29, 1904. Filed September 30, 1904.

776,021. Vehicle Spring.—Nels Halvorsen, Stoughton, Wis. November 29, 1904. Filed January 9, 1904.

776,027. Frictional Power Transmission Device.—Ivert Larsen and Robert Hardie, Chicago, Ill. November 29, 1904. Filed August 19, 1903.



No. 776,023.

No. 776,047.

776,078. Running Gear for Vehicles.—John F. Murphy, Jackson, Mich. November 29, 1904. Filed January 15, 1904.

776,111. Wrench Attachment.—Alexander L. Cherry, McKeesport, Pa. November 29, 1904. Filed September 6, 1904.

The invention relates to a hardened, tapering sawtooth jaw, which can be attached to any monkey wrench, thereby adapting it for use as a pipe wrench.

776,118. Speed Regulator for Explosion Engines.—Michael H. Daly, Charles City, Ia. November 29, 1904. Filed September 30, 1903.

776,161. Hydrocarbon Burner.—William T. Wood, Nashville, Tenn. November 29, 1904. Filed February 9, 1904.

776,188. Lubricator.—Malon La Quay, Chicago, Ill. November 29, 1904. Filed December 14, 1903.

776,192. Protective Coating or Covering for Storage Battery Plates.—Achille Meygret, Paris, France. November 29, 1904. Filed June 29, 1903.

776,202. Controller for Electrical Vehicles.—Henry H. Cutler, Milwaukee, Wis. November 29, 1904. Filed April 15, 1903.

776,228. Engine Crank.—Conrad J. Englert, Schenectady, N. Y. November 29, 1904. Filed October 16, 1903.

776,231. Vapor Burner.—Antoine Gateau, Chicago, Ill. November 29, 1904. Filed November 5, 1903.

776,240. Lubricating Apparatus.—Henry Hamelle, Paris, France. November 29, 1904. Filed December 31, 1903.

776,288. Power Transmitting Device.—James H. Baker, Saratoga Springs, N. Y. November 29, 1904. Filed March 7, 1904.

776,350. Vehicle Wheel.—William L. Ring and Perry L. Cooper, Saginaw, Mich. November 29, 1904. Filed March 22, 1904.

776,351. Nut Lock.—Thomas J. Robertson, Oakhill, and Louis Haneke, Eureka Springs, Ark. November 29, 1904. Filed July 23, 1904.

776,376. Rotary Engine.—John A. S. Becker, Freeport, Ill. November 29, 1904. Filed October 10, 1904.

776,382. Spoke Tension Hub.—Chauncey E. Brownson, Lansing, Mich. November 29, 1904. Filed May 20, 1904.

776,387. Rotary Motor.—Charles O. Deutschmann, Hampstead Heath, London, England. November 29, 1904. Filed March 7, 1902.

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A Question of Policy.

A correspondent has asked why we devote so much space to descriptions of and other matter pertaining to American built cars, which he considers, for the most part, poorly designed and cheaply constructed, and do not give more attention to cars of foreign manufacture.

To him, and to any others of our readers who may think we have given too close attention to home products, we would say that ours is an American publication, and our chief aim naturally is to further the interests of the American motor car's user and builder; to educate the former so that he may secure the most satisfactory results in the use of his car, and to indicate to the latter what improvements are suggested by the critical test of use.

The best way to help the individual motorist seems to be to educate him in the construction and care of his car; to show him the purpose of every part and the attention it requires The best way to help the manufacturer is to show him, through the experience of the user, the weaknesses of his products, and the defects that need correction.

A constantly increasing number of American motorists use the product of American manufacturers, and for this reason we have found it necessary to devote ourselves principally to the American car, giving as fully as we are able descriptions of its detail construction and ungarbled experiences of its users.

It should not be inferred that we believe nothing is to be gained from a study of the product of foreign makers. On the contrary, we bow to the genius of the French designers, who have brought their industry to its present high state of perfection and taught the whole world its first lessons in auto building. It has been our policy in the past, and will continue to be in the future, to give, from time to time, as space is afforded and merit deserves, descriptions of the various improvements made abroad in motor car construction. American designers have yet much to learn from many of their foreign contemporaries, especially as to the refinement of details, but in general design they must work out their own salvation, for they have their own peculiar problems to solve; and, furthermore, it would seem that the tendency of foreign design is to depart from the lines of what undoubtedly is to be the typical American car of the future.

The Nickel-Iron versus the Lead Cell in Automobile Work.

In a paper recently read before the Electrical Section of the Western Society of Engineers interesting comparative data was presented concerning the Edison nickel-iron storage cell and the ordinary lead cell, and in the discussion which followed the question of the relative merits of the two types of accumulators in automobile practice was dwelt upon at some length.

The general impression which one might gather from the paper and discussion is that, while the Edison cell doubtless possesses some important advantages, it also is subject to serious compensating drawbacks, and that, while this new cell may achieve successful application in traction work, its advent is not likely to prove revolutionary or epoch making in the history of the electric vehicle.

The wonderful claims which have been put forth for the Edison cell and the distinguished reputation of its inventor have led a great many would-be automobilists to defer the purchase of gasoline and steam cars, under the expectation that the new cell would endow the electric vehicle with the powers possessed by cars of the other two motive powers.

Apparently these hopes are not to be

realized, and, while the application of the new cell may furnish a battery possessing greater mechanical stability, superior durability to withstand a great number of charges and discharges, even at excessively high rates, and perhaps a considerably reduced weight, as compared with a lead battery of the same capacity, the inferior electrical efficiency of the Edison cell and its much greater present cost would go far toward annulling these advantages, and render the gain incident to its adoption open to serious question.

It seems to be generally admitted that the Edison cell is a construction much better adapted to protracted serviceability under road vibration than is the lead cell, and, furthermore, capable of much rougher treatment in charging and discharging without damage. One of its advantages appears to be its very low minimum charging time, which enables it to be recharged, it is claimed, in about one-third the period required by the lead cell. This should prove an advantage in its automobile application, as delay at charging stations is very annoying. The further consideration that it gives off no acid fumes during the process is a desirable feature. One interesting point brought out by the discussion of the paper is the fact that no indication is furnished by the voltage of the Edison cell as to when charging is complete. With the lead cell the voltage rise furnishes an infallible guide as to when the charging current should be cut off. The result of this peculiarity of the nickel-iron cell is, that unless the amount of the ampere hour discharge which has been taken from the cell is known, the current necessary for a full charge has to be put into it in order to make sure that it contains its full electrical capacity, and this necessarily results in a working electrical efficiency even lower than the normal.

The watt hour efficiency of the Edison cell as stated in the paper is 55 per cent., as against 70 to 75 per cent. for the lead battery, and figures are elsewhere given which attribute a watt hour efficiency of 46 per cent. to the Edison and 70 per cent. to the lead cell. Unless care be taken to determine the extent to which the Edison cell has been discharged and to supply charging current upon this basis, the watt hour efficiency may fall well below the figures quoted, especially when high charging rates are employed.

In the paper quoted the present initial cost of the Edison cell is given as nearly double that of the lead cell for the same watt hour capacity, and the weight of the nickel-iron equipment is stated to be about 32 per cent. less than that of the lead cell of the automobile type for the same energy stored. In this connection it should be remembered that about 1.6 as many Edison cells are required for a given voltage as of the lead accumulator, owing to the low voltage of the former—1.23 volts, as compared with 1.98 volts, the working pressure of the latter. In point of bulk per unit of electrical energy stored, the figures given show the Edison cell to possess some advantage.

Winter Use.

There is still a very general impression in the public mind that automobiles are not capable of practicable use during the winter, while as a matter of fact there are but very few days during the cold season when their operation is so difficult as to be out of the question. This mistaken idea is not so widespread in the large cities, where commercial vehicles are in extensive use and are seen upon the streets under most adverse conditions, as it is in smaller cities, where the vehicles owned are practically all devoted to pleasure and are put out of commission as soon as disagreeable driving weather commences. The public at large hastily assumes that the automobile, because it is not used in winter, cannot be so used.

This misconception, it is believed, prevents the sale of many vehicles, especially for city runabout service, for possible customers, in many instances, will not invest in what they regard as exclusively a warm weather vehicle adapted only to use during a fraction of the year. It would seem that agents and dealers take too little pains to demonstrate the powers of their cars to overcome winter conditions in urban localities.

If their vehicles were kept running during cold and snowy weather, as could readily be done by resort to well known necessary precautions, the tradition that the automobile is exclusively a summer conveyance would soon be discountenanced.

Every motor vehicle which is seen in successful operation upon city streets under weather conditions which are still generally regarded as prohibitive to self propelled traction strengthens the demand for these vehicles upon the part of those persons who desire a conveyance for performing the all the year round runabout service which many lines of business require. "Seeing is believing," and every demonstration of the serviceability of the motor car during the snowy season makes for an increase of faith in the capabilities of the new power.

Mechanically Attached Tires.

The records of the Patent Office would seem to indicate that a considerable amount of mental energy is being expended throughout the country at the present time in the conception and working out of mechanically attached pneumatic tires. Hardly a week passes but one or more patents are granted on devices of this kind; and while it is not yet in the class with the non-refillable bottle, it seems likely that it soon will have assumed as many different shapes, and, like its older rival, will have accomplished no good beyond furnishing a source of income to the patent attorneys.

Tires of this type are all much alike in general construction. In fact, the requirements, in so far as attaching and detaching are concerned, are restricted, and the possible structural combinations so few that inventors have a narrow field in which to exercise their powers of origination, and their results must perforce be nearly alike. Yet so diligently do they stick to their self-imposed tasks, and so numerous are they, that one is prone to inquire what they are seeking. Is it the solution of the tire problem? If so, they are like marksmen who shoot well but know not where to aim, for the solution does not lie in the direction in which they are working.

Real tire trouble consists not in the difficulty experienced in removing a tire from or attaching it to a rim, but rather in the cause which makes its removal necessary, and the motorist is not looking with nearly so much anxiety for the tire that can be easily removed as for the tire that need not be removed. So far as he is concerned, if his tires will stay in proper condition it matters not by what means they are attached, and if his tires do not remain in proper condition the ease or difficulty with which he can remove a quantity of damaged rubber and fabric from the rim of a wheel and substitute for it a new tire of substantial value in dollars and cents usually gives him less concern than does the cost of the operation.

It would seem to be more to the point if those with inventive inclinations who are now working on mechanically attached pneumatic tires were to divert their atten-

tion to the production of a tire which will have lasting qualities. Undoubtedly long strides have been made in the development of this tire, especially during the past year, when the proper construction of the fabric to be used and the quality of rubber to be employed have, more than ever before, been made subjects for scientific study, but perfection is still a long way off. However, with a greater number struggling along there is increased likelihood that someone will eventually reach the goal.

Danger in Handling Gasoline.

The recent destruction by fire of a large garage in New York city, reported in our paper last week, is an illustration of what is likely to happen where quantities of gasoline are stored or handled if the greatest of care is not used at all times and the most thorough precautions taken. While in this particular case the direct cause is not known, there is evidence which seems to show that at the time the fire broke out conditions existed which might easily have been at least the indirect cause of the destruction and loss which followed.

The superintendent of the Bureau of Combustibles, one of whose duties is to see that the city ordinances regarding the storage of gasoline are enforced, has reported, unofficially at least, after an examination of the ruins, that the owners of the garage had complied with the law in every particular. Assuming this to be true it merely serves to prove that city laws or insurance regulations, no matter how complete, cannot be depended upon to prevent such fires. It is evident that these laws and regulations must be supplemented by the greatest care on the part of those who handle this very volatile fluid, and that if the vigil is for a moment relaxed serious results are likely to follow.

"Familiarity breeds contempt," and through the constant handling of gasoline, its inflammability and destructive powers, if not entirely overlooked, soon come to be lightly regarded, and the precautions necessary for safety are not taken. It is timely, therefore, again to call the attention of motorists who have as yet had no unfortunate experience of the kind mentioned to the facts herein contained, and to remind them that the fluid which has such power to propel their cars has also the power to destroy them, and to do damage of a more serious nature if it is not properly handled.

Water Cooling of Gasoline Motors.

By Thos. J. Fay, E. E.

In a cooler, if we assume that the water is to be maintained at some predetermined temperature, say 203° Fahr., then, too, we must allow for the use of a circulating pump sufficiently large to move the body of water fast enough to equalize the differences of temperature that will be set up between the points of heat absorption and the points at which heat will be abstracted from the water. Furthermore, in order that the water may be maintained at a constant temperature, as much heat must be abstracted from the water by the cooler as is abstracted from the motor cylinders by the water. In other words a balance must be maintained, else a constant temperature cannot result. It is plain that all the heat absorbed by the water must be abstracted from it by the air passing through the cooler; hence it follows that the quantity of air passing through the cooler must be adequate for the purpose.

It would not be difficult to estimate the quantity required if we but knew the efficiency of the air for the purpose under the conditions that govern the operation. In the matter of the water the problem is not so serious, because an excess circulation can be maintained with scarcely any effort, and that, too, without using a large body of water, because the water is used through its cycle of heating and cooling repeatedly, suffering no substantial loss, provided the temperature is maintained below the boiling point, i. e., 212° Fahr., under a pressure of one atmosphere, or under such conditions as prevail when water is boiled in an open pot at the sea level.

The best temperature, no doubt, at which to maintain the water is about 203° Fahr., that is, if we take into account the effect of "jacket" temperature upon the motor efficiency.

It is of course obvious that a perfectly uniform temperature is much to be desired. It is equally plain that a low temperature defeats a high thermal efficiency. On the other hand, if the temperature of the water is maintained at the boiling point, water will be evaporated, thereby constantly diminishing the available supply, and introducing the annoyance of having to replenish it at frequent intervals. Were it not for this fact it would be feasible to work the cooling water at a somewhat higher temperature. In fact in this connection the writer is able to say that on one occasion he put the jackets under pressure and evaporated the water under a pressure of about 35 pounds per square inch (gauge), thus establishing a uniform jacket temperature of 280° Fahr. and the increased value of the water due to its latent heat of evaporation.

Since one therm is the result of each degree change in the temperature, 1 pound of water between the freezing point (32° Fahr.) and the boiling point (212° Fahr.), the maximum possible thermal value of this medium in its liquid state of aggregation is 180.9 therms. [One "therm" is equal to 778 foot pounds of mechanical effort, and is the result when 1 pound of water is advanced in temperature by 1° Fahr.] But owing to the latent heat of evaporation, which is the condition which prevails when water is changed in its state of aggregation from liquid to steam under a pressure of one atmosphere, the ability of the water to abstract heat is equal to 965.7 therms per pound from that cause alone. There is a further increase in the value of the water when it is subjected to pressure, and assuming a gauge pressure of 35 pounds per square inch we may say the ability of a pound of water will be increased by 21.3 therms, so that, assuming water alone with a change in temperature of, say, 100° Fahr., the thermal value will be about 100 therms per pound. If, however, the same pound of water is evaporated under a pressure of 35 pounds per square inch, the abstracting value becomes 986.7 therms, or nearly ten times more. The temperature resulting, i. e., 280° Fahr., was found to be feasible enough, and it cannot be said that the lubricating oil failed to perform its function on this account; yet, even so, the trouble of having to replenish the water thus evaporated amounts to more than any possible gain.

Whether the combination of a well designed cooler, an ample circulating pump and a vigorous fan can be improved upon, is hard to say. Indeed, at this stage of the development of motor car designs the preponderance of evidence seems to greatly favor the water circulation methods.

It is believed the fan equipment has received but scant consideration in the main, and, moreover, it is possible to believe that with a fan of suitable proportions, capable of moving the required volume of air, the weight of the required cooler might be reduced to possibly one-half the weight now found in the coolers in general use. At the present time this part of a motor car represents not far from 3 pounds per horse power. True, there are some coolers of less than this weight, but there are also coolers whose weight per horse power exceeds it.

With a view to fixing upon some scheme of design, by means of which the proportions of coolers may be established with some degree of certainty, it will be necessary to consult the laws governing the heat phenomena. Light, heat and electricity are not dissimilar in many respects. As, for illustration, the radiation of both light and heat take place between bodies at all distances apart, following a common law. Conduction takes place in bodies, and with electricity as with heat, and is directly proportional to the area of the bodies involved; that is, assuming the conduction to be internal.

Referring to heat, convection is a valuable property. Heat is transferred and diffused in a fluid mass when motion is set

up in that mass. Conduction takes place in a stagnant fluid mass at a very slow rate, whereas convection, due to the motion imparted to the particles of the mass, hastens the equalizing process to a very marked extent. In the cooling process we have to deal with each of these phenomena, i. e., radiation, conduction and convection; radiation from the hot to the adjacent cool surfaces; conduction between the moving mass of cooling water and the moving volume of cooling air; that is to say, conduction through the retaining walls, and convection within the moving mass of water, as well as within the moving volume of air.

In a hydrocarbon motor the thermal distribution may be set down approximately as follows:

	Per Cent.
Conversion to useful work	16
Loss by radiation	16
Loss through exhaust	16
Loss through the cooler	52
Total	100

It follows that the real problem is how to deal with about 52 per cent. of the total heat liberated by the explosive mixture.

The loss through the cooler in therms:

$$T = \frac{\left(\frac{H.\,P.}{0.16}\right) \times 0.52 \times 33{,}000}{778}$$

= rate of loss in therms.

In horse power:

$$H.\,P._1 = \left(\frac{H.\,P.}{0.16}\right) \times 0.52$$

= rate of horse power loss.

In watts:

$$W = \left(\frac{H.\,P.}{0.16}\right) \times 0.52 \times 746$$

= rate of watts loss.

In which H. P. = rating of motor in horse power, and H. $P._1$ = loss to cooler in horse power.

If we take a 16 horse power motor for purposes of illustration we may say:

$$T = \frac{\left(\frac{16}{0.16}\right) \times 0.52 \times 33{,}000}{778} = 2.205.6$$

= rate of loss in therms.

$$H.\,P._1 = \left(\frac{16}{0.16}\right) \times 0.52$$

= 52 rate of horse power loss.

$$W = \left(\frac{16}{0.16}\right) \times 0.52 \times 746 = 38.792$$

= rate of loss in watts = 38.792 ÷ 1.000 = 38,792 kilowatts.

The rate of loss in actual practice is a variable quantity, for the reason that the rate of combustion of the explosive mixture is not a constant value. There is one thing certain, nevertheless; the rate of jacket loss is more nearly constant than the rate at which useful work takes place. In other words the thermal efficiency is not constant. This latter consideration has a marked effect upon the cooler, especially in view of the fact that:

(a) The rate at which water is circulated decreases with the motor speed.

(b) The rate at which air is circulated decreases with the motor speed.

(c) The percentage loss to the jacket does not decrease in direct proportion to the decrease in speed, having in mind, of course, the usual conditions of practice in which both the pump and the fan are driven by the motor and change speed at the same rate with it. The result is that a cooler that might be adequate in a given case under conditions of a maximum speed might fall short of the requirement in the event of a considerable reduction of that speed.

With indifferent features of design it is fairly safe to assume that 40 square inches of exposed cooler surface will barely suffice for 1 square inch of cylinder wetted surface, counting all walls exposed to the action of the cooling water on one side and hot gases of combustion on the other side. This ratio of heating to cooling surface means a large and heavy cooler, when the cooler is viewed from the standpoint of its weight in pounds per horse power. Brisco says with well designed "fin tube" coolers 38 square inches of cooler surface will suffice for 1 square inch of motor wetted surface; air velocity, 1,760 feet per minute; water circulation at 80° Fahr. intake, and heated to 180° Fahr. during the cycle. In the Brisco test, using 8 No. 22 B. & S. G. thickness of wall, five-eighth inch outside diameter tubing, with 1¾ inch gills or fins, spaces to give thirty-eight such gills to the foot, the gills were of copper, soldered to the copper tubing. Each tube was 24 inches long, and the tubes were banked in two rows. The depth of the cooler was, therefore, 3½ inches, and the total length of tubing was 192 inches, affording 2,912 square inches of cooler radiating surface. This cooler accommodated a motor as follows:

$$H.\,P. = \left(\frac{115^2 \times 152.5 \times 1{,}000}{10^9}\right) 4 = 8 \text{ h. p.}$$

The motor wetted heating surface was said to be 76 square inches, hence, 2,912 ÷ 76 = 38.3 square inches per square inch of motor heating surface.

The writer on one occasion was able to prove out under conditions as follows:

$$\text{Motor, H. P.} = \left(\frac{165^2 \times 170 \times 4 \times 1{,}000}{10^9}\right) 4 = 74;$$

wetted heating surface, 1,024 square inches; cooler, 18,480 square inches, cellular; water temperature, 200° Fahr.; air velocity, 1,760 feet per minute. Hence, 18,480 ÷ 1,024 = 18.04 square inches of cooler per square inch of motor heating surface. The weight of this cooler was very nearly 1 pound per horse power. The depth was 4 inches, and the front area was 600 square inches. In actual road work no water was lost, nor is it believed that the cooler was worked to its absolute limit. In other words, it might have been possible to reduce the depth of this cooler to, say, 3 inches, because depth in a cooler is a very questionable quantity at best. For illustration, in the same car the writer tried a deeper cooler, as follows: Front area, 600 square inches; depth, 5 inches; radiating surface, 21,840 square inches; ratio, 21,840 ÷ 1,024 = 21.3; temperature of water, 196° Fahr., at 1,760 feet per minute of air velocity. This cooler weighed 135 ÷ 74 = 1.82 pounds per horse power, with a distinct disadvantage in cost and tire trouble without a recompense.

If the lighter of the two coolers could have been reduced to 3 inches depth—a mere assumption with no better excuse than judgment—the result would have been as follows: Front area, 600 square inches; depth, 3 inches; radiating surface, 13.110 square inches, and, therefore, 13,110 ÷ 1,024 = 12.8 square inches radiating surface of cooler for 1 square inch of wetted heating surface. The weight would probably be about 81 ÷ 74 = .9 pound per horse power. Such a cooler would most likely work in a satisfactory way on a high speed car, in which great depth of cooler is of no advantage, and in which weight is a very serious disadvantage.

For cars of the racing class or the "strenuous touring" type the cooler might be reduced to formula, viz.:

$$S = \frac{d^2 \times l \times n \times s}{10^6} = \text{cooler surface in sq. in., in which}$$

d^2 = square of the diameter of the piston in millimetres,

l = length of stroke in millimetres,

n = number of cylinders,

s = angular velocity of crank in revolutions per minute,

and the following conditions exist: Depth of cooler, 4 inches; stroke of piston, from 140 to 180 millimetres; wetted surface to include all surfaces in contact with the hot products of combustion—excepting the piston head.

This formula is empirical and of necessity limited to present practice and well designed four cycle, high speed motors.

The amount of water that will best serve the purpose in any given case depends upon the capacity of the circulating pump and the efficiency of the cooler. In the case of the 74 horse power motor above mentioned we would have

$$\frac{\left(\frac{74}{0.16}\right) \times 0.52 \times 33{,}000}{778} = 10{,}180 \text{ therms,}$$

= rate of heat absorption in the water.

If the pump is designed to handle 1 pound of water per horse power per minute, then 10,180 ÷ 74 = 137.5° Fahr. increase in temperature of the water, nearly.

Limiting the maximum temperature of the water to, say, 203° Fahr., then, 203 − 137.5 = 65.5° Fahr. = temperature of the water—good enough for winter weather, but in the summer time the water would boil. Hence, assuming the water (summer) at 110° Fahr. we have 203 − 110 = 93° Fahr., and 10,180 ÷ 93 = 109.4 pounds of water, or 109.4 ÷ 74 = 1.34 pounds of water per minute per horse power rating of the motor.

It is possible, however, to use the same water more than once in a minute, and the writer has found that 1 pound of water per horse power is more than ample under conditions in which the pump is suitable in point of capacity.

The requirement of air in cubic feet per minute is quite as important as the water. One cubic foot of air at a constant atmospheric pressure weighs about 0.069 pounds at 112° Fahr., and the specific heat under the same conditions is 0.2375 therms. In the case of the above motor, assuming the loss to water as before—10,180 therms rate—we have $10,180 \div 0.2375 \times 80 = 535$ pounds air requirement per minute, and $535 \div 0.069 = 7,753$ cubic feet of air per minute, heated 80° Fahr. above that surrounding. Considering 600 square inches of cooler front area, and allowing that all the air the cooler "butts into" passes through, we may say 4.16 cubic feet of air will pass through the cooler for each 4 inches advance of the car. Hence the car must travel

$$\frac{7,753}{88 \times \left(\frac{4.16 \times 4}{12}\right)} = 7.06 \text{ miles per hour,}$$

and when the car is standing still the fan must displace the equivalent amount of air. Otherwise the temperature of the water will be adversely affected, since it will, as before stated, increase to the boiling point.

In a racing car the air supply is always enough and to spare in view of this demand, and for the lower speeds a six blade, 18 inch fan, suitably proportioned, seems to be equal to the occasion.

It was to Blaine we gave the credit for saying "Facts are stubborn things." Blaine said more, but it is a fact that the cooler in question proved ample for the purpose, and it is also a fact that the air must take from the water the heat that the water takes from the gas, else the water will boil.

The cooler problem is complicated somewhat by the motor problem. The quantity of heat assignable to the cooler was stated to be 52 per cent., approximately. If, however, the exhaust valves are small, the exhaust pipe in the same proportion, the muffler badly proportioned, and the timing of the valves badly adjusted, it will be extremely difficult to assign a sane value to the amount of work the cooler will be called upon to perform.

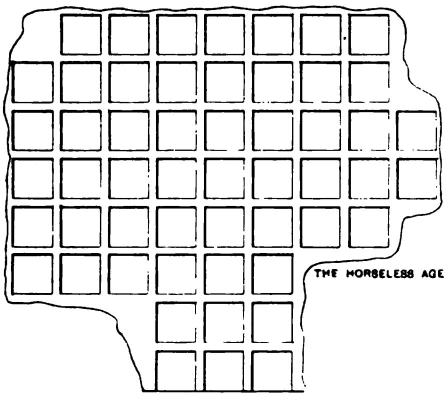


FIG. 1.

The success of even a good cooler of very liberal proportions under such conditions will be but indifferent, to say the most, whereas a reduction in weight of the car as a whole will be impossible. It is not unusual to see cars that are of overweight with very light motors. The fact of the matter is, in all probability, the motor is too light, and as a result the coolers too heavy, and again the fan may be too small, thus making it necessary to add weight to the cooler on that account.

There are other instances in which the water piping is badly proportioned, and usually too heavy. There is absolutely no drawback to a high velocity of the water, such as would result from the use of small diameter piping. The water might be made to travel at as much as 200 feet per minute, with no chance of trouble from that source.

On one occasion the writer weighed the water piping and fittings on a 16 horse power car, and found that some 67 pounds of material of that class was tucked away under the bonnet. In contrast with this tire consuming abomination, it is only necessary to say that a big racing car, upward of 90 horse power, requires but about one-third of the weight set down above for the 16 horse power car.

For a 16 horse power touring car there is no good reason why the weight of the cooler, fan, piping, fittings, pump and water should exceed the following weight:

	Pounds.
Cooler	40
Fan	8
Pump	9
Piping and fittings	20
Water	40
Total	117

A total weight that is susceptible of treatment with a fair chance of reducing down to even less than 100 pounds, without in any way affecting the efficiency or durability of the equipment unless to reduce the tire depreciation—a reduction that motorists will hail with delight. In any event a cable tow about one's neck, as it were, loses its advantage when there are too many turns, and it seems quite plain that any condition that demands a large cooler, excess piping, a surplus of water and a big circulating pump is too much of a good thing.

It was pointed out hereinbefore that the amount of air about the cooler must be adequate to meet the demands made upon it. If we assume that a 16 horse power motor gives up heat to the circulating water at the rate of 2,205 therms, then the air through the cooler must abstract about the same thermal value from the water, else the temperature will increase.

The value of a cubic foot of air for cooling purposes depends primarily upon the specific heat of air at a constant pressure, and again upon the initial temperature of

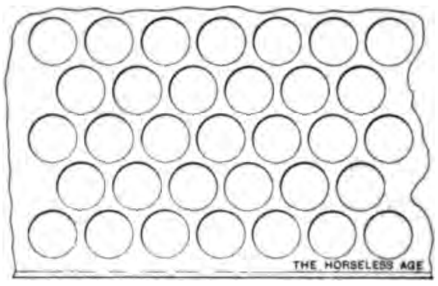


FIG. 2.

the air as it enters the cooler. The temperature of the air ejected or drawn from the cooler depends upon the depth of the cooler, the velocity of the air and the temperature of the walls against which the air slides. There is one other pertinent condition, i. e., the area of the respective sections of the air current; if conduction in the air strata is a necessary factor, to any great extent, the efficiency of the air for the purpose will be materially reduced. A necessary condition then is that in which a large surface is presented by the cooler for the incoming air to play over, and, too, it is necessary that the thickness of the air strata be that agreeable to the velocity imparted to the air volume, on the one hand, and the depth of the cooler on the other hand, assuming a constant temperature of the walls in contact.

In cellular coolers it has been found that proportions as shown in Fig. 1 are very efficient, while the weight of water within the cooler proper is quite low, because the actual layer of water back of each surface is limited to about 1-32 of an inch. The cooler Fig. 2 is not so efficient, nor is the weight efficiency so low, and besides the weight of entrapped water is very much greater.

The best depth of these types of cooler may be considered about as follows:

Miles Per Hour Maximum.	Depth of Cooler in Inches.
6	6
12	5
25	4
50	3
100	2

The above values are approximate, and are introduced more to illustrate a point than otherwise. It is a moral certainty, as shown by tests, that a cooler of 6 inches depth is the limit. The writer has found also that a cooler of more than 3 inches depth is of no value in so far as the excess depth is concerned upon a high speed car. It is proper to consider that the figures given for depth are in view of well designed, properly proportioned coolers.

The front area, assuming coolers to be located on the front of the chassis, will depend upon the cooling surface required, but the cooling surface required depends upon the efficiency of that surface. It is generally conceded that the efficiency of the cooling surface depends upon the depth of a cooler. Assuming a constant air velocity,

the effect of depth upon the efficiency is probably not far from:

Depth in Inches.	Relative Value in Per Cent.
1½	100
3	53
4.5	39

Color is a factor in determining the efficiency of cooler surfaces. Dead black is no doubt the best, and polished bright metal surfaces about the least efficient. A coating of lampblack paint is all that is necessary to cover the color question. Smoothness of surface has much to do with the question as well. A very smooth surface is very inefficient as compared with a very rough surface. The lampblack applied roughly corrects this evil to a marked extent. Style of design is a question of taste rather than a matter of efficiency, for, in so far as efficiency is concerned, a square inch of radiating surface has a certain value independent of style. A detached fin is not the equal of an integral fin, nor is a tin fin upon a copper tube equal to a copper fin on a copper tube, even though the tin fin, like the copper fin, is soldered to the tube. The efficiency of fins is nearly as good as the efficiency of other surface when the fins are but little more than the tube diameter and suitably spaced, but for a given thickness of fin the excess of fin over tube diameter is definitely limited.

World's Production of Iron in 1903.

Messrs. James Watson & Co., Glasgow, have just published statistics on the production of raw iron during 1903, from which the following figures have been extracted:

The production, which in 1901 was 39,940,000 tons, increased to 43,480,000 tons in 1902 and reached 45,480,000 tons in 1903. The United States stands at the head with a production of 18,010,000 tons, against 17,820,000 in 1902 and 15,800,000 in 1901. Germany wrested the second place from Great Britain in 1903, its production being 10,090,000 tons, against 8,400,000 in 1902 and 7,790,000 in 1901. Great Britain occupies the third place with an output of 8,810,000 tons, against 8,520,000 in 1902 and 7,850,000 in 1901. The output in France, which in 1903 amounted to 2,830,000 tons, has increased by 400,421 tons as compared with 1902 and by 427,428 tons as compared with the production of 1901. Belgium produced 1,300,000 tons in 1903, an increase of 196,301 tons over 1902 and 533,701 tons over 1901. Spain's production amounted to 380,284 tons.

The output has decreased in the following countries: Russia, 2,400,000 tons, or 118,404 tons less than in 1902; Austria-Hungary, 1,320,000 tons, or 108,814 tons less than in 1902; Sweden, 489,700 tons, a decrease of 34,300 tons from the amount produced in 1902.—R. M. Bartleman, Consul, Seville, Spain.

LESSONS of THE ROAD

The Motorist and Other Users of the Highways.

By S.

During the current year, the sixth in which I have operated a motor car, I have used my runabout more than ever before as a business vehicle rather than for pleasure in a city of medium size, and so have had much greater reason and opportunity to consider the attitude of the man on the sidewalk and the driver of the horse toward the motor and its operator. Although I have much sympathy for both of them in many of their antagonisms, yet for the most part they are unreasonable, and generally do not realize it.

We all know some of the chief reasons for this. The driver has long had a practical monopoly of the road. As a rule he is familiar with the traits of the animal he drives, and leaves him more or less unguided, even going so far as habitually to leave the reins loose, while giving attention to anything and everything except his team. He is also accustomed to leave his horse unfastened, or held only by an easily dragged weight, when making a temporary stop. The pedestrian has acquired the habit, when he takes to the roadway for any reason, of depending more upon his ears than upon his eyes, or of trusting to the alertness of drivers and their anxiety to avoid him.

My uncomfortable experiences with horses, in which I feel that I have been quite blameless, have been mostly with those standing unhitched at the curb and deserted by their drivers. When vehicles are standing on either side, trolley cars running in the middle, and considerable traffic moving in a street which is none too wide, the motor car is often obliged to approach the driverless animals much closer than they can endure. Many a horse, which when traveling would pay little or no attention to the car, objects to its being driven up to him or passing at close quarters. In fright he usually turns upon the sidewalk; the passersby scurry out of the way instead of helping; the shouting and clatter bring the driver to the scene, sometimes to find a shaft or some part of the harness broken, or the load upset. Then, of course, the autoist comes in for a round of absolutely undeserved curses.

We all know the criminally careless person who, even in a city street, leaves little children or women more or less helpless at the mercy of his untethered horse. I pass a vehicle of this sort with the utmost caution, and sometimes back away and go in another direction, but cannot help wishing every time that there were a punishment for the careless one which would "fit the crime."

Again, I often get unearned abuse from the driver who holds his reins loosely and at the same time fails to watch his horse. When the horse shies, perhaps because of some combination of circumstances likely to arise at any time, and in which the car has a part, he makes quite a demonstration before the slack reins can be gathered up and the animal controlled. Much less frequent, and in my experience, resulting seriously but once, is the case of the team entrusted to an incompetent adult or to a child. Of course, no human male, boy or man, ever admits himself incompetent to drive the average horse; but I occasionally see one whom I think something less than entirely proficient. Women drivers generally come into one of two classes; either they are expert and know it, or they distrust themselves so far that they take precautions which their brothers would scorn. Sometimes I think that if, in cities at least, persons intending to drive were required to be examined, licensed and numbered, it would not be wholly unjust or without advantage to the public. But if this were done the examination would most likely be of the sort which I passed with unexpected ease several years ago. I applied for a license to run my car in the park system of a certain large city. The clerk took my name and looked through the door at my machine. "Have you run here this morning from L——?" "Yes." "Guess you will do." And the ordeal, which I had approached with some slight misgiving, was over.

I am disturbed less by the careless drivers than by encountering daily, as I do, the city throng afoot, men, women and children, the adults walking in the roadway anywhere, with no regard to crossing, and stepping from the sidewalks in the busiest streets without a glance in either direction, and the children using the streets for a playground, unchecked by anybody.

The reason is that, though I am anxious to avoid giving offense to any, it happens almost daily that I encounter black looks, if not ugly words, often from those for whose safety I have been most solicitous. My runabout is steam driven and practically noiseless, and is, as all such vehicles are, easily guided, accelerated, stopped or reversed, and I go at a moderate pace wherever caution is needed.

One respect in which I fail to please is in the use of the horn. I have often noted the persistent and unnecessary tooting in which some motorists indulge; it frequently seems to be done merely to invite attention, though no doubt it is sometimes the result of nervousness; and it has to my ear an arrogant and imperative note, as if it said, "Get off the earth and make room for me!" But in trying to avoid a superfluity of noise, an effort which still seems to me worth while, I encounter people who either like to hear the horn or who have come to the view that it serves the purpose of bells on a sleigh and ought to be used continuously. Often

I come to a full stop rather than startle some unconscious individual with a blast likely to upset his or her nervous system. Is my good intention appreciated? Not so; three out of five of the crossers who discover that I have stopped on their account either scowl blackly at me or mutter, "Why don't he blow his horn?" or, if they are women, "He ought to ring his bell." Then I try the noisy method at the next crossing in my desire to do what is expected of me, and my sensibilities are wounded by the result. Though I am moving but slowly and menacing no person's safety, men look up and make a little unnecessary run for the walk; women exclaim, stop, look, and then scurry to the curbstone—generally to the one they have left, even when much more than half way across, rather than to the nearer one—and I am forced to come to a full stop, which I might as well have done quietly in the first place, saving all the fuss.

Sometimes the method of approaching a full crossing at an extremely slow rate, literally wedging through, seems to suit everybody but the young fellow who must needs put in his request to "hurry up." I realize the impossibility of pleasing all at all times, but when I am walking and observe the disregard of the rights of others shown by some motorists, it seems my duty when in my own machine to tend to the other extreme and help to restore an average of decency.

The men who fail to recognize at all that it is incumbent upon them to use especial care in leaving the walks for the roadways seem very numerous. Nothing is more common than to see persons crossing with their eyes upon the ground or upon a newspaper, oblivious to what is going on around them. Sometimes their gaze is attracted by something at a distance, and they look nowhere else. They stop in the middle of the street to read a bulletin or to chat with a friend; they cannot wait to reach the established crossings, but step into the street anywhere, and they seem to consider that all traffic should be suspended while they saunter across. Within a week I encountered one of the latter class. I blew the horn, and, because he was elderly, stopped short two or three yards from him. He executed a wild gyration and started for the curb, swearing at me profusely and heartily the while. I have applied my best intelligence in endeavoring to determine what ground for offense I had given that man, but no satisfactory solution has as yet occurred to me.

It must be that reading the lurid accounts in the daily journals, most of which are at least saffron tinged, has given many the idea that any and every motor car is an erratic and uncontrollable monster, as dangerous when quiescent as when in motion. Else why do some people, and especially ladies, refuse to pass in front of me when I stop for them? I have tried the experiment repeatedly, and more likely than not they will either positively refuse to proceed or will make a detour to go behind me. Once I succeeded in my plan by a method which I shall not try again. A handsomely dressed lady whom I supposed had seen me had not, as I found. I stopped for her and raised my hat, but, instead of proceeding, she stepped back. I put my foot on the reverse pedal and rapidly backed two rods or more. She tossed her head, and, with a haughty and offended air, proceeded on her way. Apparently she also was angry; I must have overdone the thing. But I shall keep on trying to inspire more general confidence in the horseless carriage by doing for the man in the street my full duty and a part of his, according to my best judgment.

Our Massachusetts automobile law states plainly enough what is demanded of operators of machines, so that the horse driver knows what he has a right to expect. What I should like to see is an equally plain statement of the rules which drivers and foot passengers must follow if they would avoid "contributory negligence," and covering not only the driving of horses but also leaving them unattended by the way.

The Versatility of the Motor Car.

By Chas. S. Dennis.

Practical experience brings out the virtues of a man, a beast, a machine or even an automobile. That a brainless motor carriage should become a missionary sounds like fiction, and that the same brainless machine should save men and things from the fire fiend and from a watery grave, and should even aid in saving souls, reads like the fancy of a novelist. But truth is always stranger than fiction, as the following tales, mere records of certain happenings, will serve to show.

SAVED FROM THE FIRE FIEND.

While traveling at a 10 mile an hour rate over a deserted country road, near the village of Topsfield, Mass., one pleasant Sunday, I happened to look back to enjoy a beautiful bit of scenery, and was startled at discovering a light flashing near the roof of a pretty hillside farmhouse, which we had just passed. My friends said it was nothing or at worst the setting sun reflected on the window panes, but I glanced back again, and this time saw a sheet of flame creeping up the roof. I turned my carriage quickly, and drove it back to the house at a pace that would have landed us in jail if the police had been around. We jumped out as we set the brakes hard in the farmyard, and prepared to fight the fire.

We had not sent in a second alarm, but another carriage followed us into the yard, and a third, a steam carriage, trailed along in its wake. There is nothing like a fire in the country for a chance to speed automobiles. After a council of war we decided that the steam carriage should go to the village for help, while the rest of us formed a bucket brigade and salvage corps. The way we passed buckets of water from the farm well to the blazing building and hustled out the furniture—carefully laying the mirrors on the feather beds and resting the piano under the apple tree—showed that automobiling had given us as good wind and muscle as any crew of firemen could boast. We saved all of the furniture, but the house burned down.

Our work was not nearly done, however, when back came the steam carriage at a pace that threatened to break all records, if not the carriage, and did break all the motor laws.

Aboard it were three fire extinguishers, and three of our brave "firemen" grabbed them and skipped up the ladder to the roof to squirt their contents on the fiery flames, but those blamed extinguishers would not work, and we had to go back to the water buckets. In the course of time along came the village fire department, and we stopped operations of the bucket brigade long enough to inquire why the extinguishers were empty. "Consarn it," shouted one brawny firemen in reply, "how did we know there was going to be a fire?" That was more than we could answer. We did not know it ourselves, but the bitter experience of standing for hours on a country road trying to make a stone from a neighboring wall serve as a wrench, screwdriver and jack had taught us that an ounce of precaution is worth a pound of cure in running an automobile, if it is not in the Topsfield fire department.

SAVED FROM THE WATERY GRAVE.

The next rescue accomplished by our remarkable car was from the pure and limpid waters of Wenham Lake, in the pretty North Shore town of Wenham. We swung around the broad curve of the fine macadam road along the borders of the lake late one afternoon and were startled at hearing loud cries for help. We looked out onto the lake, and there were two men standing knee deep in the water, apparently resting upon some irregular shaped platform, the top of which projected above the water and had a strangely familiar look, suggesting the lines of an auto. We stopped short. The unfortunate pair in the lake shouted for us to send out a boat. Now, we had about everything but lifeboats and life preservers in our repair kit, so we told them to swim ashore, as the bank looked shallow. Over they came, and they had a lively race for the safe and solid land. They had quite an interesting story to tell us, which some novelist might work up into the tale of the drowned autocar. They had run down to the lake in their steam carriage to fill up the water tank. This done, they started to back away, but, a new man steering, they ran a little off the road, and in trying to stop quickly he had thrown the lever forward to the limit and the car had leaped over the bank and down into the lake. There was 300 pounds of steam in the boiler, but like true motorists they decided to go down with their car, even to a watery grave, and

stuck to it until it came to a stop nearly 100 feet from shore.

We had come upon them at an opportune moment, and having saved them they asked if we would also save their car. To make a tugboat or marine wrecker of our car was not to our liking, so we "hiked" off to a neighboring farm to hire a pair of lusty plow horses, a strong rope and a farmer's boy who was a good swimmer. With this equipment we returned to the lake, and after about five minutes of hard labor a line was fast to the car and the horses were slowly pulling the wreck from the lake. It must have been great sport for the equines to pull their metallic successor from its watery grave, for any self respecting horse can swim like a duck and would have been mortified if found drowned.

When the carriage was safe on dry land we took it in tow and started for the repair shop, but the verdant owner had forgotten to open his air chamber, and we pumped up about 300 pounds of air as we moved along. The carriage actually pulled hard going down hill. The only reason we did not blow it into the sky was because we stopped about 100 yards too soon. We received a vote of thanks for our work—the carriage and I, but we do not feel as proud of our rescue as of that of the farm from the fiery flames.

SAVED FROM MOTORLESS DEPTHS BELOW.

About as near as we have come to saving soles is to ride in our car and save our footwear, but a friend of mine has a car which recently played an important role in soul saving. It appears from the story, as our friend relates it, that a parson in his town had an appointment to preach at a fashionable summer resort twenty miles away. The train did not run to the place on Sundays, nor did the street cars, consequently the minister had to decide between riding twenty miles behind his mare, no easy drive, or going Saturday in the train and coming back Monday morning, which journey was too long to be relished. While he was debating as to which horn of the dilemma he should seize, my friend with the car came to his rescue. "'Tis but an hour's ride," he said, and the minister decided to accept the offer of rapid transit, and in respect to the clergy and the occasion my friend confined his gait within the limits of the law. The minister is not so much opposed to Sunday automobile riding as he was. Now my friend is figuring that he will have a 90 horse power golden chariot to drive over the streets paved with gold, all because he did something to help the minister save souls in a neighboring summer resort.

When it isn't one thing it is another. Another friend of mine ran out of gasoline about a mile from home at 11 o'clock at night, and, being lame, he decided to wait and see if someone wouldn't come along. In about twenty minutes another car did come, and after waking up the neighbors they borrowed a tin pail and got a quart of gasoline. After thanking the auto man and biding him good night, he put this quart in the tank, grasped the handle and turned, but no explosion. Then he adjusted the sparking mechanism, still no explosion. He next decided that the supply pipe must be clogged, so he ran a wire through, but got no gasoline. Then he said, "You don't suppose in the dark I was fool enough to put that gasoline in the water tank, do you?" "Well, that was just what you did," said the man with him. It was necessary to get some of that gasoline out or walk, so he took the injector, drew some off the top, put it in the tank, and started. By repeating this operation a number of times he was able to make the last mile in about forty minutes.

A Careless Repair Job.

By L. R. C.

Having become a victim of the auto craze, I purchased a 12 horse power single cylinder tonneau car of American make, which was considered one of the best and most reliable on the market, and which, although I have had much trouble, I consider to be about as good as any of the more modern cars of domestic make. The car was purchased from the agents in New York, and I spent a day in their repair department working with an obliging machinist trying to get a clear idea of the insides, and then we went out for a little practice in the park. We found a fairly secluded circular driveway in the upper end, and there I took my first lessons in driving.

It did not take me long to get used to the different levers and pedals, and in about an hour I informed my teacher that I was ready to take the car through the main drive and down to the shop. My proposition did not seem to please him particularly, but he finally consented, and we reached the shop safely, much to his relief and my own.

I made arrangements with the agent to take the car out to my home in New Jersey the next evening, and the agent, who also lived near me, obligingly suggested that he would go along with me.

The next evening about 8 o'clock we started, and everything went beautifully all the way down Broadway to the Cortlandt street ferry and through Jersey City and out on the meadows between Jersey City and Newark.

When about 2 miles from Newark the agent, who was operating, said "She is dragging," and we came to a stop about 100 yards from a desolate looking road house and started to investigate (at least he did, and I followed instructions and tried to look wise).

We went all over the principal parts of the car, such as batteries, vibrator, spark coil, spark plug, etc., but everything appeared to be in a perfectly normal condition, and as the fog was thick and the mosquitos ravenous we were just about to give up our search and take a trolley car to Newark when the agent discovered that the connection between the 2 to 1 shaft and the force feed oil pump was not in place. It looked as if it had been taken off in the shop for some unknown reason, and we had run about 8 miles without a drop of oil going to the cylinder or main bearings, and consequently the piston had become heated and stuck.

After making this discovery we tried to start the car again, and as the piston and cylinder had had about two hours in which to cool off we had the satisfaction of once more hearing the regular pulsations of the engine; but we both concluded that we would run a great risk of ruining the car if we attempted to go any distance, so we decided to wake up the owner of the road house and leave the car there until next day.

After a great deal of shouting and pounding on doors and windows we were rewarded by seeing a window raised and a head come out, and we informed the owner thereof that we were in much trouble and wanted to leave our auto in his barn until next day.

A more obliging and kinder hearted man than the owner of that road house on the Newark turnpike never lived, and we proceeded at once to try and get the car in his barn, and after he had knocked a board out of the side of his barn (as the door was too narrow for us to enter) and we had managed to get the car through a very mucky barn yard (with the aid of heavy planks laid on top of the ooze), we ran her into the stable and left her there for the night. It was then about 2 o'clock, and as there would not be a trolley car passing for about an hour we decided to hoof it to Newark.

We reached Newark safely and there took a trolley to Orange, at which latter place we arrived thoroughly exhausted but ready to start in bright and early to get the oil pump connection put in place.

Put Them on the List.

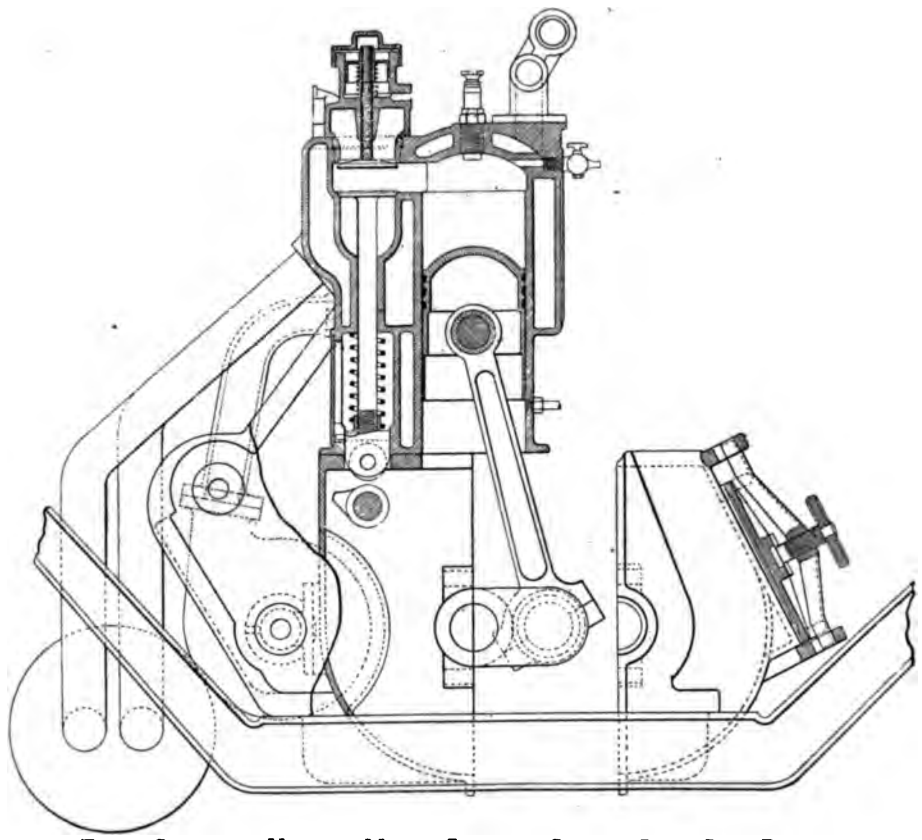
At Butler last week a woman was killed in a runaway caused by her horse taking fright at a pig by the roadside, and the same week a Mercer County man and his wife were badly hurt in a runaway from the same cause. The *Courier* suggests that action be at once taken to have the next Legislature pass a law putting hogs in the class with automobiles, obliging their owners to take out a $5 license each year, put bells on their pigs in daylight and lanterns at night, with other necessary restrictions for the protection of the people whose horses are subject to pig fright. Since automobiles came into use, no lives have been lost in all this section of the State through horses becoming frightened at the machines, and the editors of the *Courier* have driven an automobile hundreds of miles without causing the slightest injury or damage to any person we have met on the road.—Conneautville (Pa.) *Courier*.

New Vehicles and Parts

Details of the Winton 1905 Cars.

We are now able to give details regarding the construction of the various models which will constitute the product of the Winton Motor Carriage Company, of Cleveland, Ohio, during the year 1905. A general description of them has already been given in these columns, so that we can confine ourselves herein to pointing out those mechanical features which show a departure from the past practice of this company.

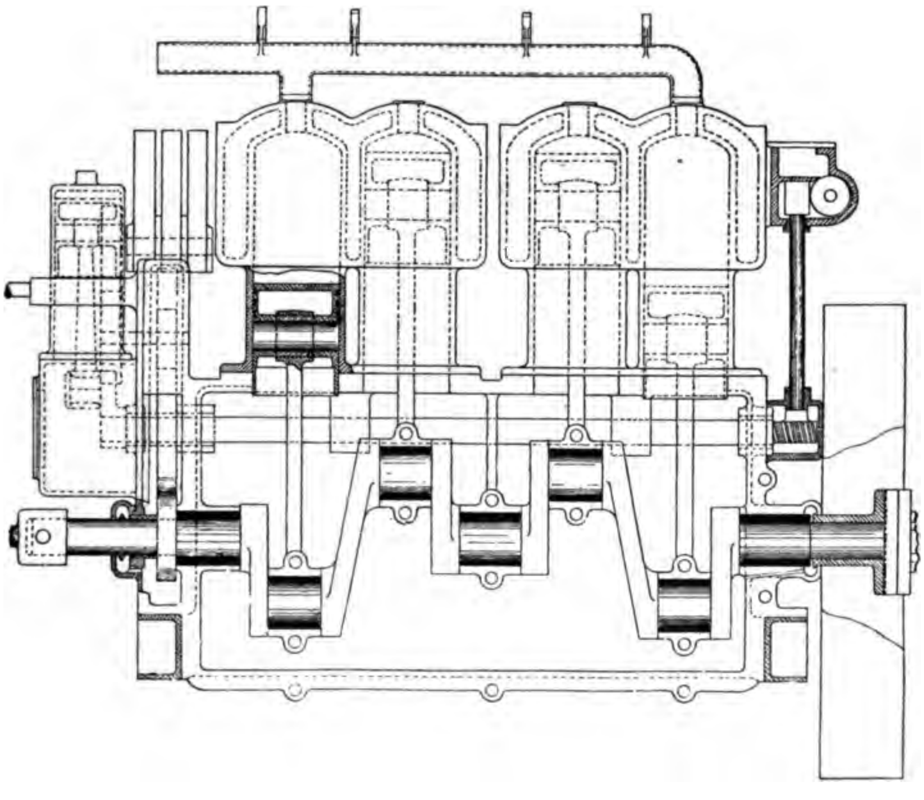
The most notable change is the adoption of a motor having vertical cylinders. In general design the three sizes, rated respectively at 16, 24 and 40 horse power, are exactly similar, so that the line drawings here shown will serve equally as well to illustrate any one of them. Probably the most notable feature of the construction of this motor is the manner in which the crank case is made. It is formed from two aluminum castings which are joined together in a vertical line and are held in position by bolts which pass through shoulders formed about the edges of each, and also by the bolts which secure the cylinders to them. In the front sectional view of the motor one side of the crank case is shown moved out of position. The forward steel channel section cross members of the frame upon which the motor rests is bent in such a manner that sufficient space is provided to permit of this part being drawn sidewise from beneath the bottom of the cylinders, after the bolts have been loosened, far enough to clear them when it is lifted up and out of the car.



FRONT SECTIONAL VIEW OF MOTOR, SHOWING SIDE OF GEAR CASE REMOVED.

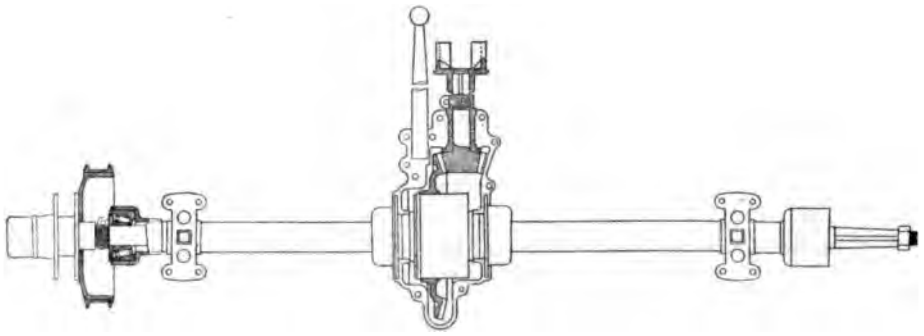
The crank shaft bearings are divided vertically, one-half being located in each part of the case, so that when the removable part is taken away the whole shaft can be removed in a similar manner if this is desired. Sufficient clearance is allowed to make it possible to remove separately any connecting rod and piston without disturbing the others or the crank shaft. A large hand hole, covered by a plate, which is clamped against the edge of the hole by a cross brace and hand screw, is provided in the side of the crank case, through which an inspection or small adjustments of the enclosed parts may be made. The employment of this construction makes it practically unnecessary, it is said, to get beneath the motor, as any repairs or adjustments necessary can be made from the top or side. The crank shaft, connecting rod and valves are all drop forgings. The bearings for the first two are all bronze bushed, the bushings being split and provision made for taking up the wear. The valve cam shaft gears, fan and pump gears and magneto idler are enclosed in a casing at the front of the motor and operate in the same plane. The water pump, which is of centrifugal type, is located near the lower part of the crank case and draws the water from the bottom of the cooler. The magneto is secured to a bracket, which brings it nearly in line with the top of the cylinder. The arrangement of the valves is shown in the front section view. The exhaust valve is of substantial construction, and at the lower end of its stem is screwed into a block, which moves in a guide and is fitted with a roller which bears against the valve cam. The exhaust valve spring is enclosed in a covered compartment, which can be entered through a hand hole at the side of the cylinders, which is covered with a plate.

The admission valve is located directly over its mate, and is automatically oper-



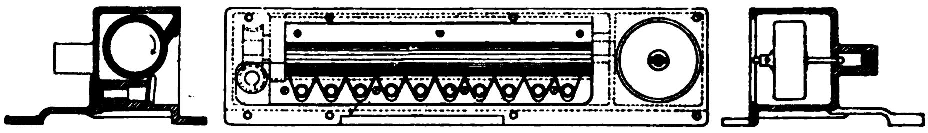
SECTIONAL SIDE VIEW OF MOTOR.

ated. The engine speed is varied by the same air control system that this concern has used for a number of years. The air port and the piston on the end of the valve stem can be seen clearly in the sketch. The pump which supplies the air pressure necessary is of similar construction to that which was employed on the "Quad" during the past season. It is located, as can be seen, at the front of the motor, occupying a vertical position and being driven by a crank formed on the end of the valve cam shaft, as can be seen from the side elevation. This same pump supplies the pressure used in forcing the gasoline from the main tank, which is located at the rear of the chassis, to a small auxiliary tank located near the top of the motor. From here the fuel runs to the carburetor by gravity. A reducing valve is placed immediately on top of the air pump, and the air for the gasoline feed is run through



WINTON REAR AXLE.

this. A pipe then conducts it to the top of the gasoline tank. A needle valve, controlled by a float in the auxiliary tank, cuts off the supply when a certain level is reached. The carburetor is located near the top of the engine, and very close to the admission ports. It is of the automatic air valve type, and is water jacketed. The incoming air acts against a flat circular valve, which is normally held in position by a long spiral spring, but which, under the action of the air, moves along inside a com-



WINTON MECHANICAL OILER.

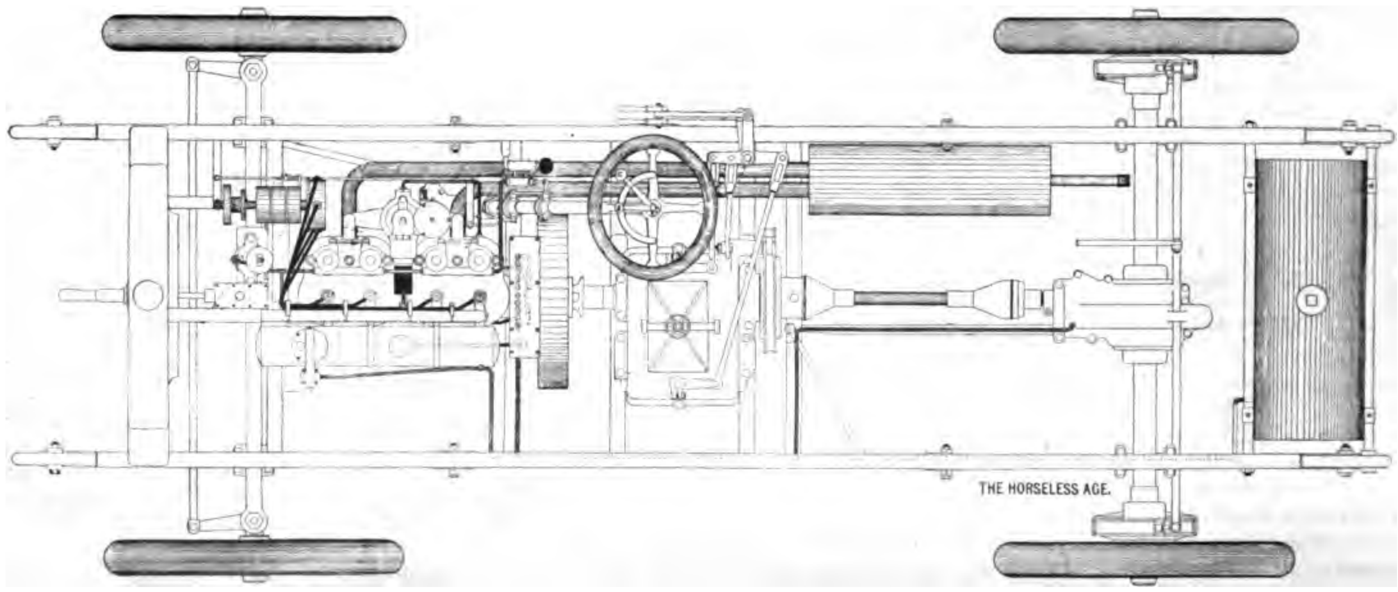
pensating cone, and thereby increases the area of the air opening.

In the lubrication system a main supply tank is located at the top of the engine, and forms part of the auxiliary gasoline tank. The oil is fed by gravity from this tank to a mechanical oiler, which is attached to the rear cylinder of the motor across the back. It is driven by worm gearing and a vertical shaft from the half time shaft, and is provided with a float controlled valve, by which the supply of oil to it is regulated. The internal construction of this device is shown in the sketch accompanying, which gives a top view and a sectional view of each end. The oil is distributed to the pipes, which run to the various bearings by a comb resting upon a revolving roller, which picks up the oil from the bottom of the tank. The amount of oil fed can be varied by a long brush, which can be placed at varying distances from the surface of the roller, and by means of which the film of oil, which passes by to the distributing comb, can be made thicker or thinner, as is desired.

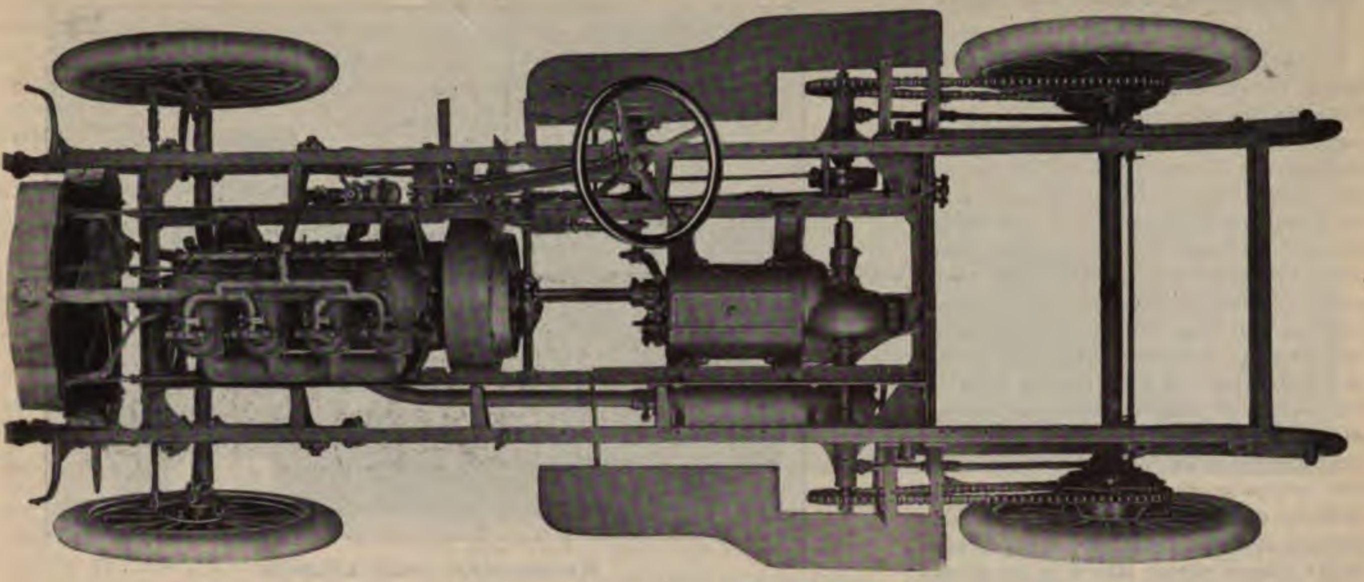
Certain detail changes have been made in the construction of the rear axle. The first of these is the substitution of rollers for the ball bearings. These are of the Timken type, and are fitted at both ends of each driving shaft. In the 16 horse power model the central gear case is divided horizontally; in the others, vertically. A strut rod of circular section is secured at its rear end to the gear case, and at its forward end to a swinging ball and socket joint attached to the frame. The bevel driving pinion is now made integral with the pinion shaft, and the driven member of the rear Cardan joint is attached to this shaft by a squared joint. A small clamp collar is threaded on the part of the shaft which protrudes from the case for taking up wear in its bearing.

Prepared Chloride of Calcium Solution.

The Carbondale Chemical Co., of Carbondale, Pa., are now putting out, in two-gallon cans, a highly concentrated solution of chloride of calcium for use in anti-freezing mixtures for the cooling systems of gasoline motors. It is of 1.4 specific gravity, containing 40 per cent. of anhydrous calcium chloride, and when diluted with an equal volume of water gives a solution which, it is said, will not freeze at 9 degrees below zero. By varying the amount of water added, a solution of any desired strength can be obtained, the freezing point being brought higher on the scale of the thermometer as the density of the solution decreases.



CHASSIS OF 1905 WINTON.



CHASSIS OF THOMAS FOUR CYLINDER CAR.

The Four Cylinder Thomas Car.

In general design the new four cylinder model of the E. R. Thomas Motor Company, of Buffalo, N. Y., is not radically different from their three cylinder model, which was described in our issue of September 21. The principal change is in the construction of the motor, a view of which is given in the accompanying photograph.

It is of the individual cylinder and horizontally split crank case type, the crank shaft being suspended in white metal bearing caps from the upper half of the case. The valves are all on one side, and the inlets, which are of the automatic type, are arranged in cages in the typical manner above the exhaust valves. The bore and stroke are respectively 5 and 5½ inches, and the rated power, 40, is obtained at 1,200 revolutions per minute. The water jackets are cast integral with the cylinders, the latter being bolted to the crank case by four studs.

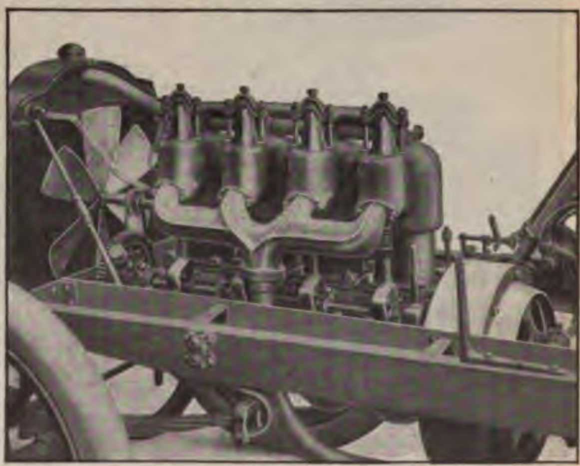
The piston is 6 inches long, and has five quarter inch rabbet joint rings, four above the wrist pin and one at the lower end. The connecting rod, a steel casting, is of H section, the flanges being very wide and the web short. White metal is used as bushings at the upper and lower ends, the upper one being adjustable for wear, as well as the lower one. The wrist pins are tubular, 1 inch outside by one-half inch inside diameter, hardened and ground, and are held by screws tapped into the bosses.

The valves are made from nickel steel drop forgings, the inlet valves being 2⅛ inches diameter, and the exhaust 1⅞ inches. The cams are made separate from the cam shaft, and are held in place by taper pins, the latter being riveted over; a rawhide cam shaft is used, which meshes with a steel pinion on the crank shaft. The cam shaft is mounted outside the gear case, the bearings being inclosed in adjustable housings; the latter, with the shaft, is readily removable. Near the centre of this shaft is mounted a gear which drives an oil pump which takes its supply from a tank mounted on the side of the crank case, where it is kept warm. The oil is pumped to a sight feed reservoir on the dash where the pressure is regulated to any desired amount, and is forced from there through independent pipes to each cylinder. The crank shaft is finished and ground from a drop forging. The cranks are 1⅞ inches diameter, and the main shaft 2 inches. Both halves of the crank case are aluminum; the upper half, which contains the middle bearings, has a white metal bearing alloy cast in the seats provided. The caps are made of this bearing metal, being made very heavy to withstand the thrust. They are bolted on by one-half inch studs, the nuts for the latter being castellated; these bearings are lubricated by splash, while the end ones have revolving chains dipping down into independent oil wells, which hold enough oil, it is said, to last from 1,000 to 2,000 miles. Each crank has a separate basin to prevent the oil from flowing to either end on hilly roads. Ignition is by jump spark, only a single coil being used. The commutator, which is placed in plain view on the dash, consists of a primary make and break and a secondary commutator; the former consists of four hardened steel segments electrically connected together, and attached to the inside of a fibre tube; they are rubbed by a hardened steel pin attached to the shaft, which is rotated at the same speed as the cam shaft. Farther in the fibre tube are attached four brass segments, which are individually connected to their respective spark plugs; a revolving brush connected to one terminal of the coil nearly makes contact with these segments, providing a spark gap between at the time the primary circuit is closed.

The carburetor is of the float feed automatic type, the variation of the air supply being accomplished by the lifting of a thin disk against a spring which uncovers air vents beneath it. The carburetor is attached at the bottom of the engine, so that a liberal drop is allowed from the tank, which is placed beneath the seat. There is a trap provided at the outlet of the tank to catch water and dirt, which can then be drawn off through a drain cock.

The driving power is transmitted through a three speed gear box of the style used by this company heretofore, and by side chains to the rear driving wheels.

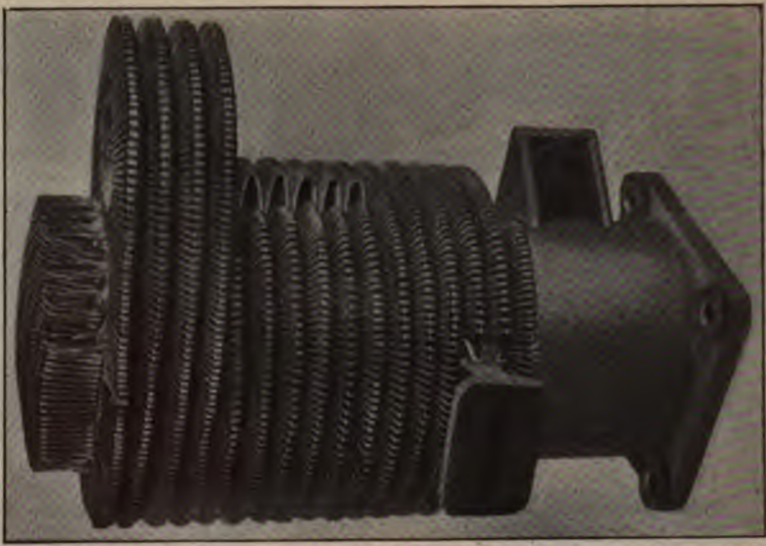
Out-of-town subscribers of The Horseless Age, who intend visiting the New York Automobile Show, are requested to communicate with the Editor, if possible mentioning the name of the hotel at which they will stop when in the city.



THOMAS FOUR CYLINDER MOTOR.

The Mahoning Motor Car Company's Car.

The method of cooling the engine cylinders is the pre-eminent feature of the cars made by the Mahoning Motor Car Company, of Youngstown, Ohio, the essentials of which are illustrated by the photographs here shown. This consists of securing to the outside of the cylinder wall and head a winding of copper wire of three-thirty-seconds inch square sections which has previously been bent to form a series of loops of triangular shape. The bent wire is cut into lengths. Each length is then strung on a copper ribbon one-sixteenth thick by one-fourth inch wide, which passes through all the small triangles and rests against the shortest side, which forms the base of each. The various lengths are then wound tightly about the cylinder wall under a considerable pressure and are placed one above another in the manner shown clearly in the photograph of the detached cylinder. The head is covered in a similar manner, except that the rows of bent wire run back and forth across it. When the cylinder has been entirely covered in this way, the whole is placed in an electroplating bath and a copper plating given it. This process is said by the makers of the car to securely fasten the radiating sections to the cylinder wall in a manner which resists all effects of heat or changes of temperature. It is claimed that 19½ square inches of radiating surface is secured for each square inch of the outside surface of the cylinder.



Mahoning Air Cooled Cylinder.

Another feature which is made use of to aid in the cooling is an auxiliary exhaust port located at the lower part of the explosion chamber, very similar in design and operation to those used in two cycle engines. The main exhaust valve seats in a detachable cage, which is secured to a port extending beyond the cylinder wall, and is of the usual poppet type operated by a cam and spring. The admission valve is located directly over it, and also provided with a self contained cage, which carries the valve seat so that both can be removed from the motor as a unit.

In addition to the means already described a fan is used to still further assist in the cooling. This is arranged to blow cool air against the top of the cylinder head and is driven by friction from the flywheel.

The company manufactures two styles of chasses, one propelled by a 9 horse power motor and the other by a motor of 24 to 28 horse power. The former is fitted by a single cylinder motor, which is placed horizontally with the crank shaft running across the car.

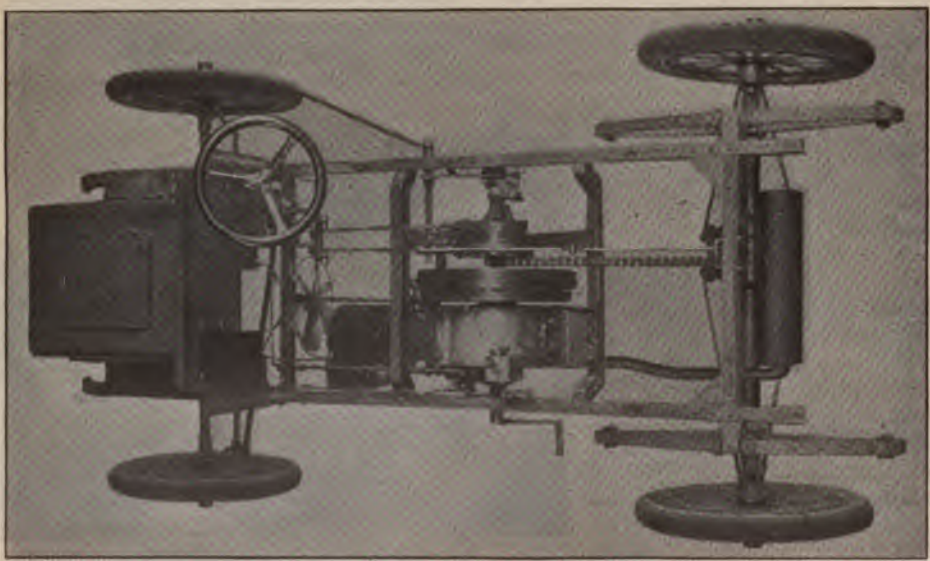
The frame is of pressed steel built up in the usual manner, with cross members and gusset plates at the corners. It is suspended on semi-elliptical springs in front which are 36 inches long, and at the rear on full elliptical springs of equal length. The ends of the upper leaves of the latter are curved downward to form brackets, from which the lower leaves are suspended by means of links. This construction is adopted to compensate for the varying lengths of the distance rods as adjustments of the driving chain are made.

A tubular axle is used in front and a live axle in the rear of the type, which provides for a centre chain drive. The driving shafts revolve on roller bearings, and the exterior housing of the axle is strongly trussed to maintain an alignment of the bearings. The differential is of the spur gear type.

The wheel base of this model is 80 inches and the gauge 56 inches. Wooden artillery type wheels are fitted, which are 28 inches in diameter and are shod with 3½ inch tires.

The motor is attached at the lower end of the crank case to a cross member bolted to the main frame, and also at the base of the cylinder by means of a lug formed on it, which bolts to a second cross member of the frame.

Ignition is effected by the jump spark system, in which dry batteries are used for the necessary electrical energy. These are carried in a box under the false bonnet in front of the dash, where are also the gasoline tank and tool box. They are all secured to the frame of the car and the coil is attached to the dash, so that the power equipment remains complete when the body is removed from the chassis. The carburetor is supplied with an automatic valve, which maintains a constant mixture as the speed of the engine varies. The motor is lubricated by a force feed pump. The fan, which is placed just forward and to the right of the cylinder head, rotates in a vertical plane. It is driven, as has been said, by a leather faced friction wheel, which bears against the beveled rim of the flywheel. The shaft which connects this wheel to the fan proper runs on ball bearings, and the fan speed is governed by the pressure of the air against the blades, so that a speed of approximately 1,800 revolutions per minute is maintained at all times regardless of the speed of the motor. This arrangement is



Mahoning Single Cylinder Chassis.

used to prevent excessive fan speeds, which would tend to wreck the blades and at the same time to secure the delivery of air at a high velocity to the cylinder head when the motor is running slowly.

The driving power is transmitted through a change gear pump of the planetary type, which provides two forward and one reverse speeds, which are thrown into and out of use by a hand lever located at the side of the operator's seat.

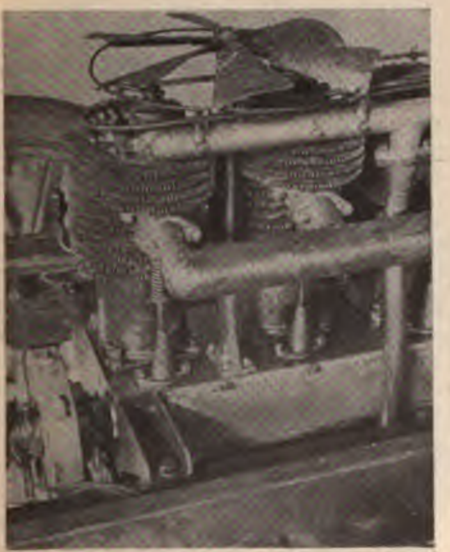
Steering is accomplished by a hand wheel and the control of the motor obtained by the variation of the time of the spark, for which purpose a small lever is located on the steering column, and by a throttle valve located in the admission valve housing, which is regulated by a small foot pedal attached near the bottom of the dash. A brake is located on the transmission group and two more act on the rear axle.

In starting the motor it is necessary to insert the detachable crank in a hole in the side of the car. This hole is covered by a sliding cover, which is connected through levers to the spark advance mechanism, and it is impossible to insert the crank while the spark is advanced beyond the centre.

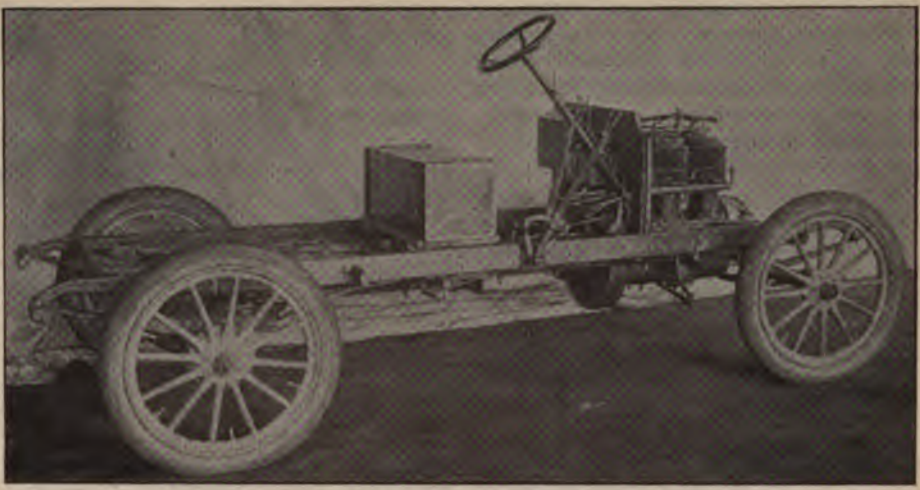
The makers offer four types of bodies with this chassis: a surrey form, runabout, physician's stanhope, or delivery wagon.

The larger chassis is equipped with a four cylinder vertical motor, which is mounted at the front of a pressed steel frame. In nearly all essentials it is the same as the single cylinder motor. The photograph of the forward part of the chassis shows its detail construction quite clearly. The individual cylinders are bolted to the top of the crank case, which carries bearings for the crank shaft between the cylinders. The supporting arms are bolted to a sub-frame of channel section. It can be seen that in this case separate fans are used for the first and second and third and fourth cylinders, which are driven by vertical shafts from the half time shaft.

In the photograph of the complete chassis



VIEW OF MAHONING FOUR CYLINDER MOTOR.



MAHONING FOUR CYLINDER CHASSIS.

the pipe running across the lower parts of the cylinders and connecting with the auxiliary exhaust parts can be seen.

The jump spark system of ignition is used, employing a separate coil for each cylinder. The commutator is located at the front of the motor. Lubrication is accomplished by a pressure feed system, in which a separate pipe is run to each of the cylinders and to the principal bearings in the motor and also to the gear case.

The transmission system in this model includes a change gear group of the sliding gear type, which provides three speeds, with a direct drive on the third. The gear case is mounted on the sub-frame to which the engine is secured. The drive is transmitted to the rear axle by propeller shaft and bevel gears.

The wheels are 32 inches in diameter and are shod with 4 inch tires. The wheel base is 100 inches and the gauge 56. The gasoline tank has a capacity of 18 gallons, and is mounted on the main frame under the forward seat. When complete the car weighs about 1,700 pounds. The equipment consists of five lamps, horn and a set of tools.

The Speedway Car.

The Charles L. Seabury and Gas Engine and Power Company, of Morris Heights, N. Y., have recently completed the first of the cars they are to build after designs by B. D. Grey. We present herewith a description of its characteristic features.

The frame, which has a uniform taper from 30⅜ inches width over all in front to 37¼ inches at the back, is of pressed steel, channel section. The flanges are tapered both ways from the centre of the car to give a trussed structure. There are four cross members. That at the front serves as a bed for the radiator; the second, in the form of an arched plate, lies between the engine and flywheel, under the crank shaft, and the third, which is slightly dropped to the level of the sub frame, is of channel section. The rear member is of the same dimensions as the sides. The sub frame is in two sections, riveted to the three forward cross members. All reinforcements are made integral with the main members, and are hot riveted.

The springs are semi-elliptical and 2 inches wide. Those in front are 40 inches in length and have seven leaves, while the rear ones have eight leaves, 48 inches long, and set very flat.

The front axle is a solid hand forging of 30 carbon steel. The pivots, which are inclined 2¼° from the vertical, are of the barrel type, the knuckle being formed around the axle pivot and swiveling on a hardened pivot pin. The bearing is upon hardened steel washers, and the construction is such that were the pivot to break the axle would not drop, but would remain in the barrel.

The wheels are of the artillery pattern, mounted upon ball bearings, and taking 34 by 4½ inch Michelin tires. The rear wheels are keyed to the live axle, the drive being by a propeller shaft and bevel gears. The steering gear is of the worm and segment type, the segment being integral with the rocker shaft.

The braking equipment consists of a band brake on the driving shaft, operated by an interlocking push pedal and a pair of enclosed internal expansion brakes on the rear wheels, pivoted at M, Fig. 3, and expanded by a cam at L.

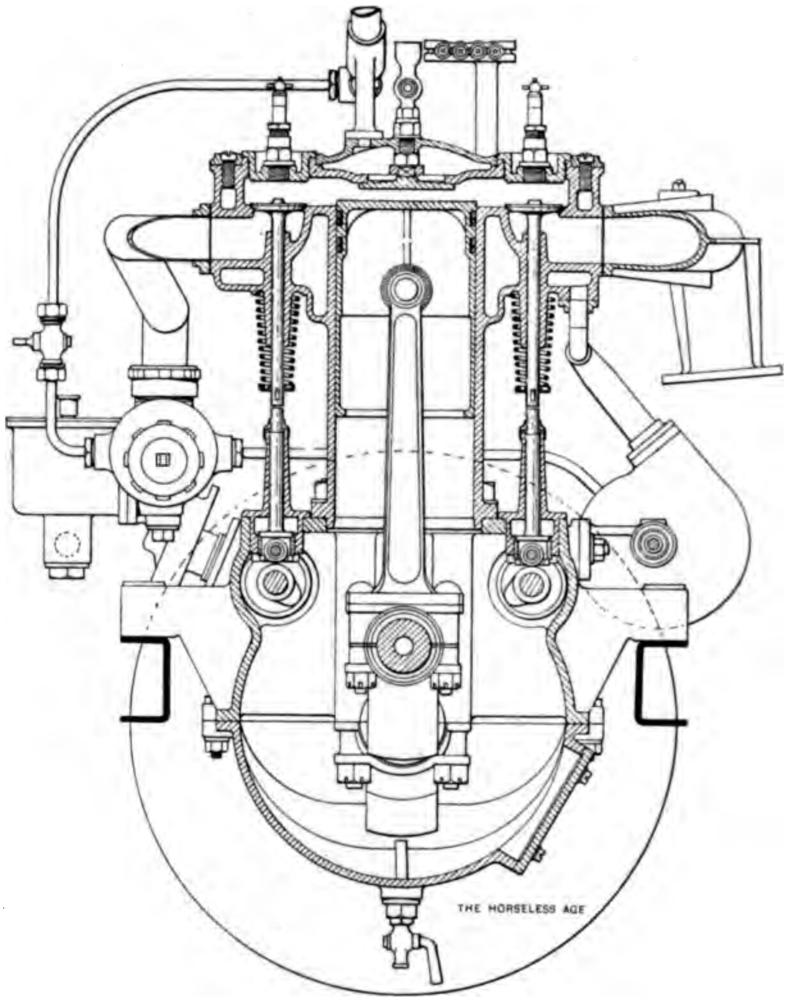
The motor is of the four cylinder, vertical pattern, with separate cylinders. The dimensions are 4½ by 5 inches, and the rating is 24 horse power, at a normal speed of 800 revolutions per minute. The speed range is from 200 to 1,500 revolutions. The jackets are integral with the cylinder castings, but have separate covers which extend over the valve pockets, and are held in place by fillister head screws. The cylinder covers are clamped in place by dogs and studs which pass through the jacket covers, and are held by nuts. A priming cup is screwed to each of these, its centre being drilled out to open communication with the cylinder. The construction is clearly shown in Fig. 1.

The tubular wrist pins, which are fas-

tened in the pistons by set screws, are hardened and ground. The corresponding ends of the connecting rods are hardened and lapped out. The pistons are 7 inches long and are packed with four eccentric rings laid in two grooves, and closing with bevel joints. The connecting rods are of I section, with bronze bushings, babbit lined at the crank end.

The crank shaft, which is forged from .03 per cent. nickel steel, has five bearings in the case. The flywheel bearing is 3½ inches long, the intermediate bearings 2⅜ inches, and that in front 2⅞ inches long. The crank pins are 2⅜ inches long. All of the bearings are 1¾ inches in diameter. The main bearings are bolted to the engine frame from below, thus making it possible to remove the lower half of the case without disturbing their adjustment. The case, which is entirely of aluminum, and held together by through bolts, is supported on the sub frame by four heavily ribbed lugs.

The valves, which are of nickel steel, double annealed, are located on opposite sides of the cylinders, and operated from separate cam shafts. They are interchangeable. The retaining springs are rested in sockets which are keyed to the valve stems instead of being hooked in slots. The cam shafts, which, like the followers, are of tool steel, revolve in fine bronze bearings. The half time gears are of machinery steel, fully housed.



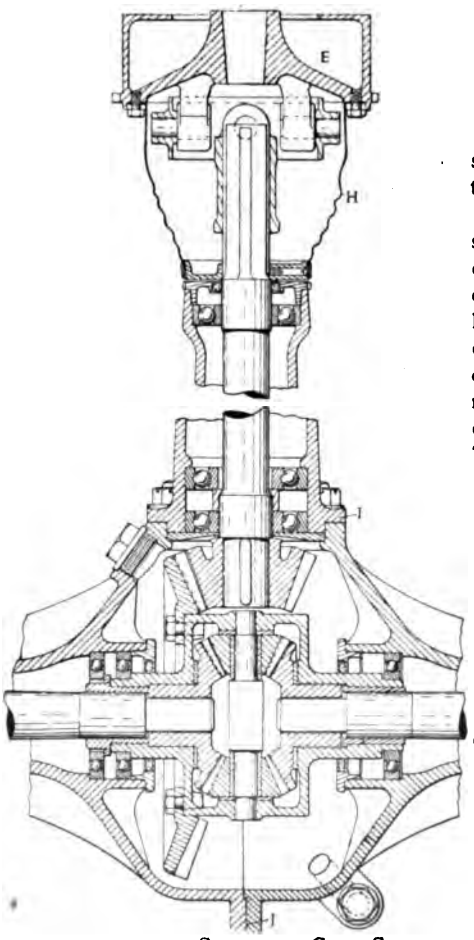
SPEEDWAY CAR—SECTIONAL VIEW OF MOTOR.

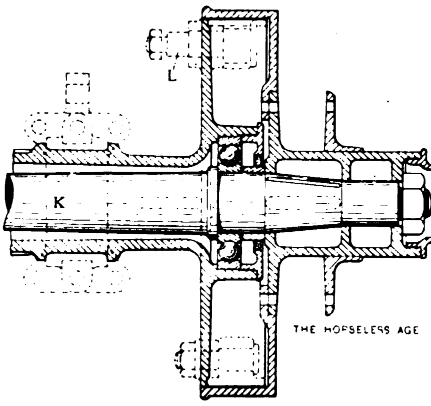
The carburetor, which is of special design, is of the Krebs type and entirely automatic.

The ignition is by a duplicate jump spark system. Two sets of plugs are used, one over each set of valves. The energy for one is obtained from a set of four accumulators and a quadruple coil mounted on the dash. The distribution for this is by a commutator of the internal ring type, mounted on the inlet side of the motor, and driven by mitre gears from the cam shaft. The other system is supplied with current from high tension magnets. The high potential wires are insulated by running them through fibre tubes carried in brass racks over the cylinders.

The gas is throttled automatically by a flyball governor and manually by a lever swinging over a stationary segment above the steering wheel. The spark timing is similarly regulated by a second lever.

The cooling system comprises 170 square feet of radiating surface in a radiator of standard form, but of rather novel structure. It consists of a series of flat, vertical tubes of sheet copper 1-16 by 3 3-16 inches in cross section, spaced three-eighths of an inch apart, and braced by zigzag strips of sheet copper, which serve as stays, and also as extended radiating surface. These are set in a heavily constructed brass tank. Air circulation through the radiator is secured by means of an induction fan mounted within the hood, and belted to the crank shaft. The circulation of the cooling water is maintained by means of an aluminum housed, gear driven pump on the exhaust side of the motor, turning at the rate of 1¼ to 1 of the crank shaft. The water circuit is from the radiator to the pump, thence to the exhaust valve jackets and about the cylinders, to the outlet at the highest point. From there it is led to the top of the radiator, where it is deflected





SPEEDWAY CAR—SECTIONAL VIEW OF REAR AXLE.

by curved vanes to circulate uniformly to the base. The total capacity of the system is 3½ gallons.

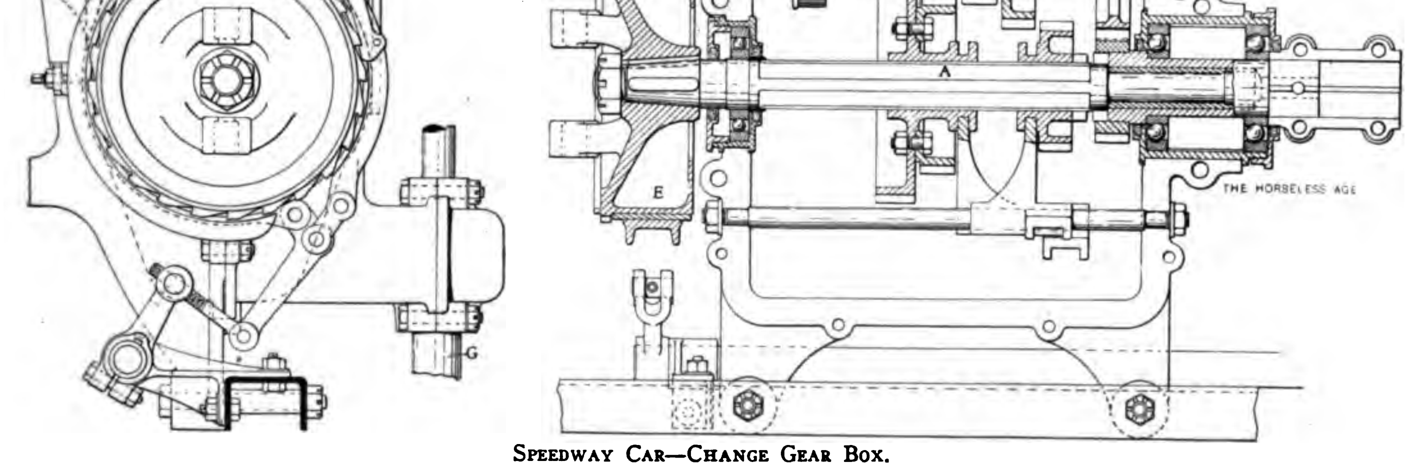
The flywheel, which is 17½ inches diameter by 3⅛ inch face, and weighs about 60 pounds, is bored out to form the driving member of the clutch. The aluminum driven member is keyed to its shaft by four splines. The shaft turns in a plain bronze bushed bearing in the crank shaft, and is coupled to the transmission by a slip joint, which allows a certain amount of flexibility between the two. A distance piece is interposed between the ends of the two shafts, and by remaining thus and compressing the spring, the clutch may be removed without further labor. The thrust of the clutch spring is taken up in the transmission.

This is of the sliding gear type, with four speeds ahead and reverse, the changes being obtained by the manipulation of two sliding trains. The sliding members are mounted on the main shaft A, Fig. 2, and are driven by four splines. The high speed, or direct drive, is by a claw clutch on the forward train. The third speed is obtained through the countershaft B, and a gear on the first train in the usual manner. The other sliding member secures the second and low speeds in the first two positions, and if moved backward through a normal point it engages the reverse. The first effect in drawing it back is to pick up the pinion D, which is mounted on a countershaft, and found integral with a second smaller pinion. The ends of the gear teeth engage a flange D, and force it to slide along its shaft until the smaller pinion meshes with the low speed gear upon the countershaft B, thus obtaining the desired movement. The idle train D is held normally out of mesh by means of a spring. A feature of the countershaft mounting is that hardened set screws C are used at the ends of the shaft to locate the position of the gears, and also to take up the end thrust due to changing speeds. Both the main gear shafts are mounted in Hess-Bright ball bearings. Two sets are employed at the front end of the main shaft, one of which takes the thrust of the clutch when disengaged, and the other the radial load due to the driving effort of the gears and the weight of the gears and shaft. The gears, which are of the steel tooth pattern, 6-8 pitch, are of 1 1-16 and 1 3-16 inches face, are carefully hardened.

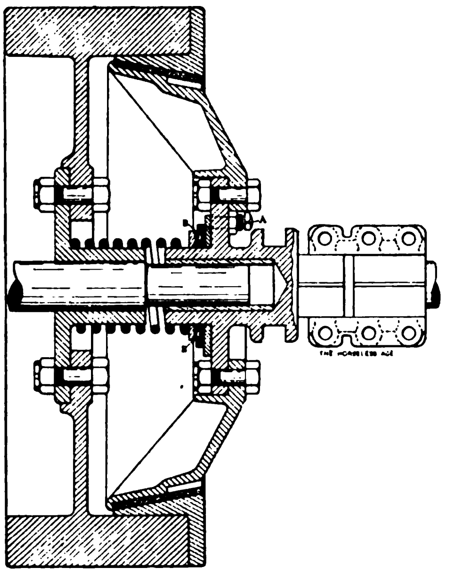
A noteworthy point in the changing mechanism is that the yokes which operate the sliding trains are actuated by rocker arms mounted on a telescoped shaft, which passes through a dome of the case G, thus eliminating all shafts sliding in and out of the case. This shaft is mounted in plain bearings, and its two members are fastened to arms which extend vertically at the side of the car to a double slotted segment. A shifting lever is mounted between these, and adapted to engage one or the other by a side pressure when in its normal position. The side pressure, besides engaging one of the shifting arms, moves the operating lever into one or the other of the two slots, and permits the gears to be changed. The method of operation is thus the same as with the selective system. The gear case is unusually compact, measuring, as it does, 12 by 15⅜ inches internally. It is bolted to the under side of the sub-frame by four heavy lugs.

A cast iron brake drum is keyed on the driving shaft, just behind the gear case. It is flanged at one side, and the other is solid and forms a part of the universal joint. Its section makes it possible to fill it with water piped from the cooling system, to cool it during the descent of long hills. Ratchet teeth are machined in a flange integral with it, and a heavy pawl F, pivoted at the side of the frame, may be engaged with these by a simple movement from the operator's seat, and serves as a detent or sprag. The brake band, which is of bronze, with cast iron shoes, is pivoted on an extension of the reverse jackshaft. The universal joint is supplemented by a slip joint to secure maximum flexibility, and is surrounded by a leather dust cover H.

The rear axle is of cast steel construction and made in three sections. The differential housing and axle is divided at the centre of the differential J, each section being heavily ribbed, and embracing seats for the outer bearings, and a flange which mounts the studs L and M, and closes the emergency brake drum, rendering it practically dust proof. The third section is of tubular structure and encloses the propeller shaft. This shaft is mounted in three ball bearings, two for radial load and one for the thrust of the bevel driving gears. The gears are of No. 4 pitch and 2 inch face. The thrust of the larger, which is bolted to the differential box, is absorbed by a ball bearing on the left axle stub. The differential is of the bevel gear type, and noteworthy because the driving gears are squared over the ends of the axle stubs K, making is possible to remove them without disturbing the adjustment.



SPEEDWAY CAR—CHANGE GEAR BOX.



Brew-Hatcher Clutch.

The Brew-Hatcher Company's 1905 Product.

The Brew-Hatcher Company, of Cleveland, Ohio, are bringing out for the season of 1905 several new automobile specialties, including a four cylinder engine, a change gear, clutch, carburetor and a patent joint for gasoline pipes.

CLUTCH.

A sectional view of the clutch which this company is now making is given herewith. It is of the internal conical type, with leather and metal friction surfaces which are held in engagement by a spiral spring wound about the end of the engine crank shaft where it projects through the flywheel flange. The thrust of the inner end of this spring is taken by this flange, while that at the outer end is taken on a ball thrust bearing B, which bears against a hardened plate, supported by the flange, to which the driven clutch member is bolted. The adjustment of this spring is made by a series of set screws A, held in position by lock nuts, which extend through the flange last mentioned, and bear against the plate which forms the rear part of the ball thrust bearing. To tighten the spring these screws are run into the flange and the plate accordingly is brought so much nearer the flywheel flange.

The friction surfaces are disengaged by means of the usual lever and fork combination, the latter part of which fits between shoulders formed on the driven shaft. The end of this shaft is squared, and fits into a socket of similar section to permit of the necessary endwise movement.

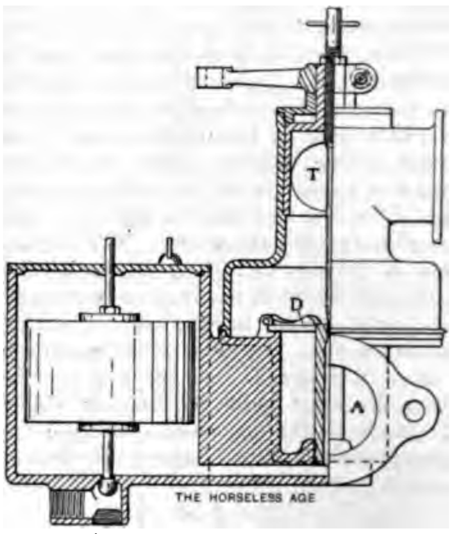
CHANGE SPEED GEAR.

The change speed gear is of the typical slide gear type in which the secondary shaft is driven at all times through the permanent engagement of the gears which provide the first reduction. It provides three speeds and reverse with a direct drive on the third. The sliding member fits on a squared shaft, and is made in one piece. The gears on the secondary shaft are secured against turning on it by individual keys let into the shaft, and are held in position endwise by spacing tubes which fit over the shaft and between each pair of gears. Any gear on this shaft can, therefore, be replaced. The direct drive is obtained by the meshing of an external gear with an internal gear of equal pitch diameter. Bronze bushings are used throughout, the ends of the secondary shaft are capped over, and the bearing of the main shaft is provided with felt packing washers. The gear rates are : Intermediate, 2 to 1; low, 4 to 1; reverse, 4 to 1. The gears are all of six pitch, with 1 inch faces, and are forgings, case hardened. The containing case of this group, which is designed to transmit from 18 to 24 horse power, measures 17 inches long by 10 inches deep by 11 inches wide.

CARBURETOR.

The carburetor, which is of the float feed and automatic mixture control type, embodies some novel features, as can be seen from the accompanying sketch. The float has no counterweight, but acts direct to lift the ball valve into its seat to check the supply of gasoline. Surrounding the top of the spraying nozzle are four hinged dampers, each being the quadrant of a circle. When down they completely close the air supply, but in starting the motor the suction lifts them slightly, and, owing to the fact that the area of opening provided by them in this position is considerably less than that of the air inlet, the air passes by the nozzle with increased force, and draws over sufficient gasoline to form the proper mixture. In the sketch one of the dampers is shown at D resting upon the top of the gasoline jet or nozzle. The air inlet is shown at A.

A long needle valve, one-half of which is shown, varies the adjustment of the gasoline feed, and is controlled from the top of the carburetor. As the speed of the motor increases the dampers D are thrown further open by the increased suction, and as the area of opening is increased at the same time the velocity of the air remains con-



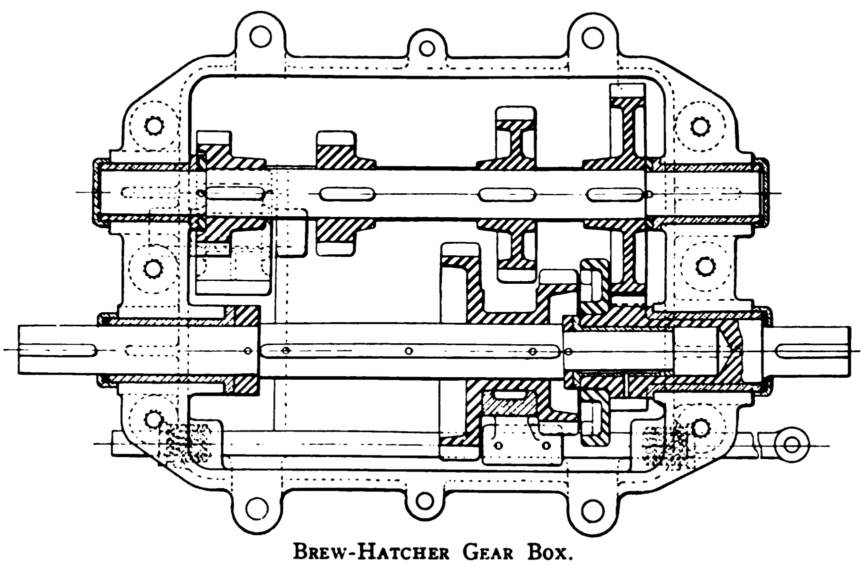
Brew-Hatcher Carburetor.

stant and the mixture uniform. The weight of these dampers is the governing factor.

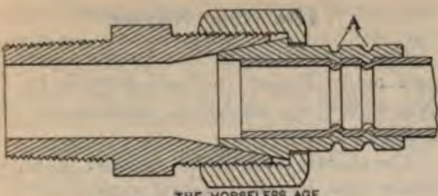
ENGINE.

The engine has four individual cylinders which are water jacketed, with the heads cast integral with the cylinder walls. The cylinders have a bore and stroke of 4 inches, and the motor is rated at 20 horse power. The valves are mechanically operated, all from one cam shaft. Plugs with taper threads screw into the top of the ports over the valves, and the spark plugs in turn screw into those which are over the admission valves. Cast manifolds joint all admission parts and exhaust parts together. The crank case is divided horizontally, and the bearings for the crank shaft are attached to the upper half, one bearing being supplied between each two cylinders.

The bearings for the wrist pins are secured to the pistons instead of to the connecting rod, and are bushed with bronze. Each cam is secured to the cam shaft by two taper pins riveted over. All gears, including those which drive the water circulating pump, are enclosed in the crank



Brew-Hatcher Gear Box.



Brew-Hatcher Gasoline Joint.

case. The inlet and outlet water pipes are each cast in one piece, and are bolted by flanges to the top of the water jacket. Lubrication is supplied to the piston by direct feed through pipes attached to the side of the cylinders, as well as by the splash system. The fly ball governor is so made that it can be set to act on either the spark advance mechanism or the throttle in the carburetor, or both, as is desired.

A flywheel 15¾ inches in diameter, weighing 100 pounds, is fitted, and the over-all length of the motor is 30¾ inches, its height 21 inches, and its width, excluding supporting arms, is 13 inches. The arms can be made of any length to meet requirements.

GASOLINE PIPE JOINT TOOL.

The sketch herewith shows a joint made between a gasoline pipe and the nipple of a union by which connection is made to a tank or carburetor with a new tool which this company is putting out for the especial purpose. The object is to make a joint without solder or screw threads, which will be gasoline tight and resist the vibrations to which it must be subjected. To do this two grooves are forced into the nipple after the pipe has been inserted in it. The metal so displaced forces a pair of corresponding grooves in the softer pipe, and fastens it within the nipple. In the sketch these grooves are shown at A.

The Baldwin Chain.

The Baldwin Chain & Manufacturing Co., of Worcester, Mass., have recently made certain improvements in both their detachable and riveted types of automobile chains. The new detachable chain is shown in Figs. 1 and 2 herewith, the former representing the links separated and the latter showing them connected.

Each stud is riveted to one end of a side link, in which, at its other end, is cut a keyhole-shaped slot. In building up the chains the inner links, which are formed by the inner side pieces and hollow studs, are placed side by side with the connecting links in the position shown in Fig. 1. The free end of each stud is then inserted in the hole in the opposite side piece, and the inner links forced apart until the studs have reached the ends of the slots in the outer links. When the chain is straightened out, as shown in Fig. 2, it is impossible to disconnect the links, as the extension of the inner side pieces beyond the studs prevents the studs from backing out of the slots. It is claimed by the makers that so long as it is necessary to twist the links until the outer side pieces are at right angles with the side pieces of the inner links, in order to disengage the studs from the slots, it is impossible for the chain to come apart by accident.

The improvement in the riveted chain consists in extending the inner side pieces in much the same way as are those of the detachable chain, except that the ends are pointed. The advantages claimed for this construction are that the side movement of the chain when in use is limited, and that the chain runs on to the sprocket teeth more smoothly, especially if the sprockets be somewhat out of alignment.

The 1905 White Limousine.

The Jones Speedometer-Odometer.

The latest product of Jos. W. Jones, of 127 West Thirty-second street, New York city, is a combination speedometer and odometer. In external appearance it resembles much the speedometers made by this concern, and is designed for use on the dash, as are they, being driven through a flexible shaft and gears. The instrument is made in two sizes, one with a 3 inch dial, which registers speeds up to 50 miles per hour, and a larger one with a 4 inch dial, on which the maximum reading is 100 miles an hour. Both show the accumulative mileage up to 10,000 miles. The device can be adapted to fit any car, it is said, provision being made for a variety of driving gear ratios.

New Baldwin Detachable Chain.

The 1905 White Limousine.

The photograph herewith shows the Limousine model which will form a part of the regular product of the White Sewing Machine Company, of Cleveland, Ohio, during 1905. The chassis is of the standard type, including the two speed gear. The driver's seat is protected by a glass shield in front and by side curtains which let down from the top to entirely inclose the space between the dash and the rear of the front seat. The inclosed portion in the rear provides seating accommodations for four people, and is upholstered and finished in russia leather. It is lighted by electric lights, the current for which is supplied by a storage battery.

There is rumor current that C. J. Glidden, of Boston, is about to start on a lecture tour in connection with his world-girdling auto exploit. Let us hope that the rumor is unfounded and that the country may be saved this calamity. There may still be people in the wilds of the Great American Desert who have never read or heard the phrase, "'Steen thousand miles in thirty-seven countries, etc.," but the newspaper reader in the East instinctively turns to another page whenever he comes across it, as he does, unfortunately, only too frequently.

OUR FOREIGN EXCHANGES

The Paris Show.

The seventh annual Salon de l'Automobile, du Cycle et des Sports was formally opened in the Grand Palais, Paris, on December 9, by President Loubet, of France. The ceremony consisted of tour of hall by the Presidential party, which was followed by decoration of several of the leading French designers and constructors with the insignia of the Legion of Honor. In the number of exhibitors and the splendor of the decoration the show, it is said, surpasses all previous ones.

The Route of the Delhi-Bombay Trials.

The Motor Union of Western India, which has organized the coming endurance trials to be conducted over the roads between Delhi and Bombay, has announced the following itinerary:

December 26—Delhi to Agra (133 miles).
December 27—Agra to Gwalior (73 miles).
December 28—Gwalior to Goona (130 miles).
December 29—Goona to Maksi (128 miles).
December 30—Maksi to Mhow (56 miles).
December 31—Mhow to Dhulia (150 miles).
January 1—Dhulia to Igatpuri (126 miles).
January 2—Igatpuri to Bombay (85 miles).

Arrangements have been made for a stock of gasoline, lubricating oil and other necessary supplies at each control. A number of the more prominent French, German, Italian and English cars have been entered, and a considerable amount of interest is manifested in these countries in the outcome of the event, which is the first automobile contest of any great importance to be held in India.

The Motor Car in Egypt.

According to a foreign contemporary, there would seem to be a very great future for the motor car in Egypt, as its utility is just now being realized. Apart from the efforts which the Governor General of the Soudan is making to introduce motor traction into the country, private initiative is likely to do much in the near future.

There is reason to believe that the Egyptian Government is favorably inclined toward the established of a motor omnibus system in the city of Cairo, and would gladly entertain any proposal of the kind put forward by a responsible company. An omnibus company exists in Cairo, as well as a tramway company; both are making large profits, in the former case amounting, it is said, to about 80 per cent. Still, tere is plenty of room for a motor omnibus company, as there are many streets in the capital which cannot be tapped by either the trams or the cumbersome horse omnibuses. Street traffic in Cairo is increasing to an enormous extent, and the advent of the motor omnibus would be hailed with the greatest satisfaction by inhabitants and visitors alike. The lattter would, no doubt, largely patronize a motor service to the Pyramids and the Virgin's Tree, both situated in the desert, and the scheme seems quite feasible.

Messrs. Theocarides & Adamides, of Alexandria, have made an application to the Ministry of Public Works for permission to run a service of motor wagons from Cairo to the quarries in the vicinity of the capital, while the Alexandria municipality has just received an application for the establishment of a similar service at Alexandria.

British Imports and Exports.

The report of the Board of Trade shows that, although there has been a falling off in the number of foreign cars imported into Great Britain during the month of October, 1904, there is a slight increase in the value. Taking cars and parts together the total value of the imports was £139,817, as against £120,066 last year. For the ten months ending October the value of the imports stood at £2,176,978, or an increase of nearly £400,000 on the same period last year. The difference between these figures and those disclosed by the exports of British made motor cars and parts is very striking. For October, for instance, there were only sixty-seven motor vehicles exported, the value of which, together with parts, was £22,275, while taking the whole year up to the end of October the value of the exports was £240,047, or a falling off of £2,200 when contrasted with the corresponding period of the preceding year.

Torquay is said to be the first town in England to establish a regular service of motor omnibuses. Steam is the motive power. For a time there were only two vehicles, but now four are at work, a fifth is in reserve, and although electric tramways are about to be started, a sixth is suggested. Notwithstanding the broken character of the year, the company received in fares £2,230, and a 7½ per cent. dividend is to be paid. Ten per cent. has been allowed for depreciation, after spending nearly £400 upon the maintenance of the omnibus, and the sum of £275 has been allowed for rubber tires. This is the actual cost, based upon the calculation that, as proved by experience, the hind tires will last for 10,000 miles and the front tires for 15,000 miles.

The New Napier.

The accompanying photograph shows a new model Napier car built recently by D. Napier & Sons, of Acton, England, for the Duke of Fife.

The chassis is of the six cylinder, 30 horse power type, having a special section hydraulic pressed steel frame with extended wheel base. The engine is fitted with a new hydraulic air regulator which adjusts the mixture of gas as the speed of the engine varies. The positively driven water circulating pump and the governors are combined on one shaft. A number of detail changes have been made over the earlier six cylinder motors of the concern which tend to give it a more symmetrical appearance.

A feature of the control mechanism is the arrangement within the dished steering wheel of a vertical hand lever operating over a notched section which controls the throttle valve in the admission pipe. The change speed gear provides three speeds forward and a reverse. It is said that because of the uniform torque produced by the six cylinder engine the car can be driven "on the throttle" at any speed from 4 to 40 miles per hour with the third gear in use.

The body of the car shown is a coupé Limousine with a roomy interior. The accommodation provides for three people on the rear seat in the usual position, while an additional seat is arranged immediately behind each door. These seats are made to completely fold up and to hinge against the sides of the body in such a manner as to be out of the way when not in use. The extension of the roof above the driver's seat is connected to the dashboard by hollow steel pillars, and over the dashboard itself is fitted a glass wind shield for the protection of the driver and passenger. This glass shield is so arranged that it can be slid into the roof above when not required.

A new committee of the Automobile Club of Great Britain has been formed, with the special object of assisting members on tour in any part of the country. The work with which the committee will chiefly concern itself will be that of recommending suitable hotels at which motorists on tour can put up without fear of being charged extortionate rates. It will also furnish advice in regard to the most suitable repair shops in given localities.

In Germany a Government bill was introduced into the Reichsrath recently by which owners as well as drivers are made responsible for injury done to persons or property by their cars. Responsibility can only be avoided by proving that the accident was due to unavoidable circumstances or to the fault of the person injured. It will, however, not be regarded as an unavoidable contingency if the accident is attributable to inferior machinery or a defect therein.

The Army Council of Great Britain has appointed a committee to consider how motor transport can be employed for military purposes during both war and peace. The committee includes Colonel H. C. L. Holden, who is also chairman of the Automobile Club.

The motor car show which is to be held by the Society of Motor Manufacturers of England at Olympia in February promises to be the largest ever held in that country. The space which is being prepared for the accommodation of exhibitors will, it is said, exceed 130,000 square feet, and it is expected that something over 1,000 cars will be shown.

Prof. H. Von Herkimer has offered a prize to be competed for on the Kessel Hills, near Kochel, in Bavaria, next year. The road selected rises in serpentine curves to a height of 1,700 metres, and, despite its excellent surface, it will severely tax the capabilities of the competing cars. The prize will be awarded to the car gaining two out of three events. Extra prizes have been offered by Prince Louis Ferdinand of Bavaria, and the German and Bavarian automobile clubs. Dr. James Von Bleichröder has also offered two prizes of £400 and £100 respectively for a race in connection with this competition.

Much annoyance has been caused motorists in certain parts of Germany by a decision given in a court of law that the police are within their rights in prohibiting the use of any streets, roads or even whole districts by automobilists. One motorist who ventured to drive his motor car in a forbidden village near Wiesbaden has been punished for his offense and the conviction has been upheld. It is pointed out that regulations of this nature affect not only private individuals but also commerce, for it is very much the custom in Germany now to use motor cars and motor cycles in supplying customers with wares from neighboring towns.

A former Bavarian miller, Herr Lettl, at present appearing at the Hippodrome, London, in a "strong man" act, grasps in each hand a rail protruding from the rear of what is claimed to be a 30 h. p. automobile, when attempts are made to start the cars in opposite directions, which attempts are frustrated, however, by Lettl's tenacious grip. It has been suggested that Herr Lettle's services should be engaged by the police authorities to regulate automobile traffic on some of the roads leading out of London.

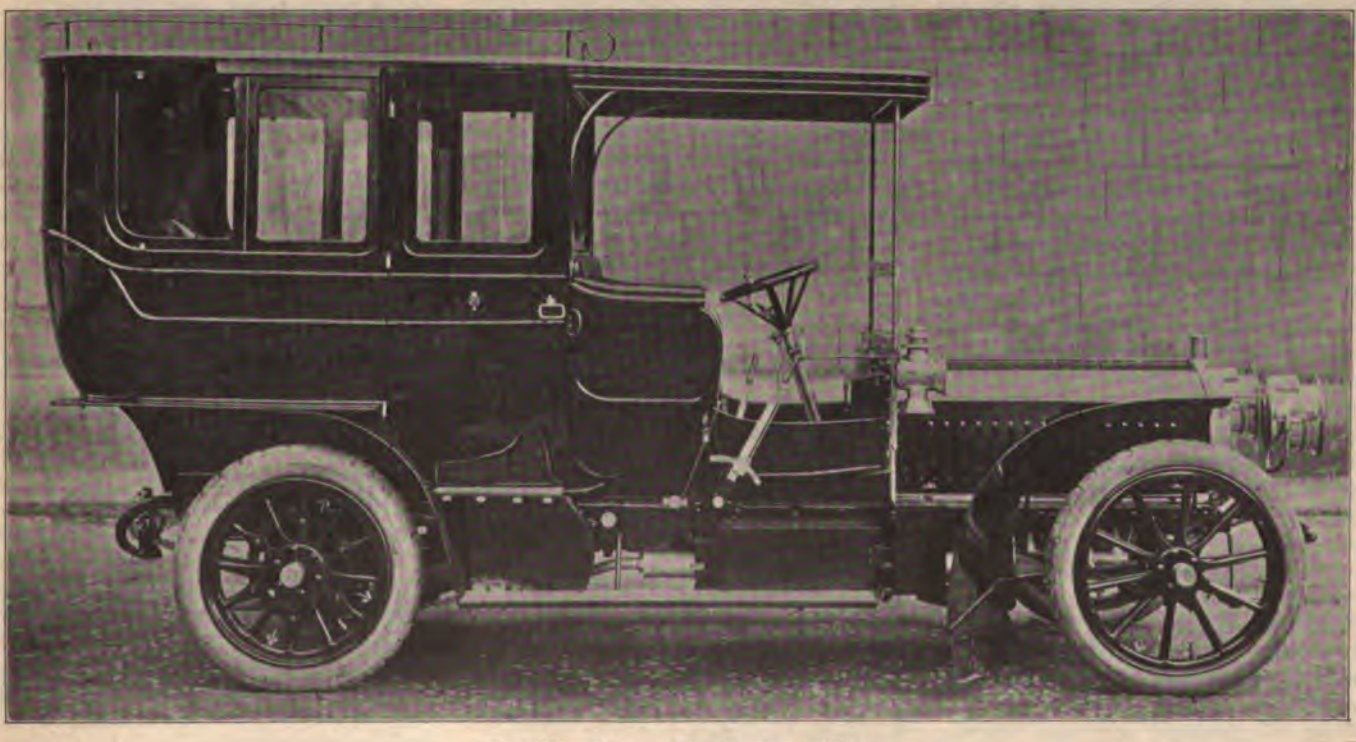
Experiments have lately been made at Millbank Barracks, England, with an armored motor propelled ambulance for army use. It is built somewhat on the lines of the more common light agricultural tractors, so that it is capable of traveling over very rough ground. It is driven by a gasoline motor of 14 horse power, and is provided with accommodation for two surgeons and their complete field outfits, as well as for the injured. The rear of the vehicle is closed by two wide doors, which, when open, form a bullet proof shield sufficiently large to protect the surgeons at their work behind it.

The Belgian Consul-General for the Australian Commonwealth states that he hears of many inquiries being made in Queensland and Victoria on the subject of automobiles. It is beginning to be recognized that well organized automobile service in some of the more thinly populated districts would prove of great service, and would serve as feeders to the railways; they could, moreover, be utilized for goods traffic, and by bringing the rural districts into touch with the towns, facilitate the sale of agricultural produce. In Victoria also, adds the Consul-General, there is a strong feeling that if automobile wagons suitable for heavy traffic over the roads in that State could be procured for about $10,000 apiece, they would prove a veritable boon.

Automobiles in Quebec.

A letter has been received from an American interested in automobiles who wishes to know the prospect of making sales of American automobiles and motor boats in this place. I have seen, as yet, only four automobiles in this city of 70,000 inhabitants. There must be a market for a great many more. If the motor for boats is any improvement on the present gasoline motors, I am sure there must be an opening for the sale of a great many of them among the large number of fishermen who have fishing rights on the numerous lakes and rivers in this vicinity. If some manufacturer would come here and attach his motor on a boat and demonstrate that it is better than any other, I am sure he would be able to make good sales.—William W. Henry, Consul, Quebec, Canada.

Out-of-town subscribers of The Horseless Age, who intend visiting the New York Automobile Show, are requested to communicate with the Editor, if possible mentioning the name of the hotel at which they will stop when in the city.



The New Napier Six Cylinder Car.

COMMUNICATIONS

An Experience With "Cooling Oil."

Editor HORSELESS AGE:

Having read in your paper of oil being used with success for cooling in automobiles, I determined to try it this winter for the purpose, and after some correspondence I received some oil from the Standard Oil Company, of New York. They called it "cooling oil."

November 26 I drew off the water from the circulation system of my car, and after taking the pump apart and putting new packing in the stuffing box, replaced the water with the oil. November 28 being rather cold I took the machine out. The thermometer had been down to 18° during the night, and was about 27° when I started out. After running not over a quarter of a mile the engine began to knock a little, and inside of half a mile was knocking so that I was forced to slip the clutch and turn toward home. By careful handling I managed to run the machine about half way back, the road being slightly down grade. I was then obliged to stop or injure the engine. I went into a store and waited half an hour for the machine to cool off, then ran home, let it stand in the yard awhile, then ran it around the block. When I came back into the yard and shut off the spark the engine was so hot that it continued to run until I had opened the back of the carriage and stopped the flow of gasoline.

The engine was very hot, but the radiator in front was cold. The oil was not circulating.

Next morning, when the weather turned warmer, I found a 2 inch split in one of my radiator tubes. I happened to be in the barn when it thawed out, and noticed the leak before a cupful of oil had escaped. I drew off the oil, took off the radiator, had it repaired, and put it back after making sure that it was clear of any obstruction.

I concluded that I had not been able to draw all the water out of the radiator, and that it had frozen in one of the pipes and prevented the circulation of the oil, so I determined to try it again.

This time I ran the engine a few minutes at a time with the car standing in the yard, watching it carefully. I opened up my oil feed to the cylinder to feed more than enough oil, as I did not want any chance of trouble from lack of it. After less than five minutes' running the engine heated so that it would explode after the spark was shut off, and the radiator in front was cold; the heat did not extend over 3 feet along the pipes from the engine. I could not pump that oil. I drew it off, put in a 33 per cent. solution of glycerine, and have had no trouble since. The glycerine solution circulates all right, which shows that my pump was working and the pipes clear.

This machine is fitted with an ordinary rotary pump, which would not pump the oil. I would like to know what sort of cooling system was used by those who used such oil with success.

I disposed of part of this oil (at his own risk) to a friend of mine who has a car which has no pump; uses a large tank and natural circulation. He thinks he can use the oil for short runs.

I have used calcium chloride solution (5 pounds to the gallon) every winter since 1899. It certainly eats the solder in the tanks. By spring a tank is apt to leak in several places. In the old cars, with large tanks and pipe connections, it did fairly well, but in the more recent radiators there is some danger of its obstructing some of the small tubes.

I have made a few rough tests with the glycerine to see how much cold it would stand. During a night in which the thermometer registered 20° a 10 per cent. solution froze, and a night at 10° froze a 15 per cent. and a 20 per cent. solution. The 33 per cent. solution was unaffected by a zero night, which is the coldest we have had here this winter.

In my acetylene gas generator I add alcohol to the water to prevent its freezing. I have used it for two or three winters without any trouble, although I notice you do not mention its use in your remarks about care of generators in cold weather. Some automobile users here are using wood alcohol with the glycerine and water in their coolers. It does not seem to me that the alcohol would stay in any generator in which the water became very warm, as its boiling point is so low.

I wish you would publish more particulars about the use of cooling oil or other solutions for the same purpose. Evidently what suits one system of cooling may not work well in another. An oil that would do the work would certainly be a good thing, but the oil I have is not suitable for use in my machine. A. N. CLARK.

[Possibly some others of our readers have had experience with cooling oils. —ED.]

Fluid for Acetylene Generators.

Editor HORSELESS AGE:

What would you recommend to take the place of water in acetylene generators during cold weather? Could one use gasoline or any liquid whose base was not water? C. M. C.

[Water is the only fluid which can be used in acetylene generators to generate gas. The only reason for desiring to avoid its use, it would seem, is that it is likely to freeze. Precautions calculated to avoid this were given in our issue of November 30.—ED.]

Ground Wires in Ignition Circuits.

Editor HORSELESS AGE:

My single cylinder car is wired in such a manner that the ground wire leads directly from its connection on the engine to the coil, and one of the three wires leading from the switch goes to the commutator.

I have recently been advised by a practical electrician that the wire which is now attached to the commutator should be grounded, and that the coil and commutator should be directly connected.

His particular point was that the ground wire should not be attached directly to the coil because of possible injury to that instrument. Is there any real reason for choice? I will say that the latter arrangement seems to give a larger and hotter spark, which, if true, would suggest that there is less resistance in the circuit so formed.

E. H. BALDWIN.

[The difference between the resistance in an ignition circuit in which "grounds" are used and that in one in which direct wiring is employed is practically unmeasurable, assuming, of course, that all connections are perfect electrically. "Grounds" are used merely as a convenience and to save unnecessary wiring, not with a view to introducing increased resistance into the circuit. As a matter of fact, it is possible that better results would follow the use of the direct wire system, as with it fewer connections are needed and the chances for a bad one are, therefore, so much the less. It is probable that in the case mentioned one of the wires was not grounded perfectly, with the result that the resistance so formed cut down the primary current and made a weaker spark in the secondary. —ED.]

Advice from a Horse Driver.

HOPEDALE, Mass., December 8, 1904.

Editor HORSELESS AGE:

I call attention to the enclosed clipping from the *American Horse Breeder*. I know Dr. Billings personally, and he may have modified his views on automobiles somewhat by the several rides I have given him. GEORGE OTIS DRAPER.

Editor American Horse Breeder:

The article in last week's *Breeder*, while amusing, does not give the impression of justice to autos and their advocates which experience has taught me should be given them. Expense, etc., to those who indulge in autos is nothing to question. Some people spend as much on horses. On the auto question I am somewhat in the position of St. Paul, who first persecuted Christians and then became one of them. The last I shall not do, but I have dropped the persecution. The only thing in which they are really annoying is the infernal dust they kick up. While my horses are exceedingly high strung, they all have "heads on them," and have never been dangerous, and now care nothing about them.

There is one thing I would like to say to people running autos. It is right to toot when coming from behind, but do stop it when you get right on to a horse, and in general never slow up either passing from behind or coming on to a horse, unless you see he is really afraid. My own horses won't look at an auto if it comes head on, no matter how fast, nor when it comes from behind, if it only comes, but they don't love one to pull up on the side of the road to let you go by. I think this really the experience of most real horsemen.

To my mind autos are in no sense so annoying nor are they really so dangerous as the great army of fools who think they can drive and merely hold reins, never hear a team behind them and seldom care or turn out to let you pass by. The roads are full of such idiots, male and female, and, for my part, I had rather they would be packed with flying autos than with the brainless and hoggish idiots who drive the majority of horses one meets on the road.

FRANK S. BILLINGS.

Testing Dry Cells.

Editor HORSELESS AGE:

In reading the article on the "Use of Electric Measuring Instruments," by Albert L. Clough, I note that he says that "when the instrument is connected the current which flows is practically the greatest the cell is capable of furnishing, and may be regarded as the maximum current on short circuit."

It would appear to me that the continual testing of dry cell batteries with an ammeter across the terminals would materially injure the life of the batteries. Am I correct?

W. H. M.

[An ammeter has practically no resistance, and for that reason it virtually forms a short circuit when connected directly to the terminals of a cell. Its use in this manner is only possible with a dry cell, as the reserve energy, as it were, is very small and the voltage drops rapidly on short circuit. An ammeter provides the only satisfactory means of testing dry cells, but should be used for as short a time as possible, and only when conditions demand. It is possible to destroy a cell by allowing the ammeter to remain connected to its terminals too long.—ED.]

Replenishing Anti-Freezing Solutions.

Editor HORSELESS AGE:

I noticed in an issue of your paper an anti-freezing mixture made from 5 pounds of calcium chloride dissolved in 1 gallon of water. Should extra solution be added to refill the tank, or should water alone be used?

A MOTORIST.

[Water only should be used to replace that part of the solution which evaporates. If considerable is lost through leaking or spilling, more solution should be added to fill the tank. It is well to draw off all the solution at reasonable intervals, to clean the circulating system thoroughly and to refill with clean solution of the proper density. —ED.]

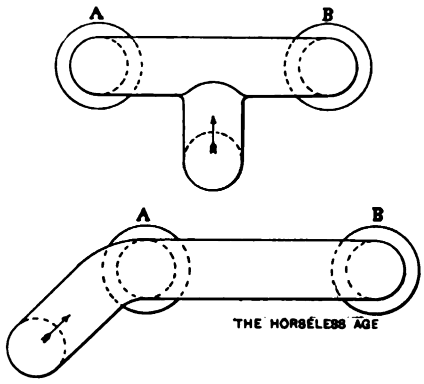
Position of the Carburetor.

Editor HORSELESS AGE:

With reference to the inclosed sketch kindly give me your opinion regarding the position of the carburetor as shown in sketches herewith. Would the cylinder marked A in the lower sketch receive a richer charge than the cylinder marked B? The distance between the cylinders being, say, 7 inches, would there be any appreciable difference in the operation of the two cylinders due to the two arrangements shown?

DRAUGHTSMAN.

[Considerable theorizing has been done as to the exact effect of the arrangement shown in the lower sketch upon the operation of the two cylinders. The preponderance of practice favors the upper arrangement, which would seem the more nearly correct theoretically, but there are several notable exceptions, one being a three cylinder motor in which the admission pipe runs directly across the three ports and the carburetor is attached at one end. Everything else being equal, it is safe to say the amount of power developed by the cylinder would practically be the same in either case.—ED.]



POSITION OF THE CARBURETOR.

Word from a User.

Editor HORSELESS AGE:

I am after information, which with me is free and without price. Some of mine has been procured a little expensively, but $1 will pay the bill to date that it has cost me for a repairman, I being determined to learn that job myself. I like the independent manner of your publication and it behooves us subscribers to stand by you and have the truth prevail. Can you or your readers tell me of a good anti-freezing mixture that is not costly? I have been using calcium chloride, at 35 cents per pound, which I find expensive and I believe I am being Chadwicked. I see some mixtures advertised to do the business, but my experience of about three years with cars is that there are a great many things made for them that are not practical and should have died with the inventor. For instance, there is the special 6x2½ dry cell made for gasoline engines only, that costs a fancy price. After you have tried them a few times you will come back to the old, common door bell battery, and you will again think you have been Chadwicked.

The tire question also interests me. For twelve years I have used the pneumatic tire in one form or other. I have from the first adhered strictly to the single tube variety, and believe today it is the best thing in the pneumatic class. I have run my car thousands of miles, and have always got back on them, but I am satisfied that the tire of the future will be solid; that the car will not be made of cast iron, and consequently will not fall to pieces if it gets a little jolt. With good spring suspension and the speed cut down there is nothing to fear with the solid tire.

GEO. J. EDWARDS.

Trade Literature Received.

Worcester Pressed Steel Company, 100 Beacon street, Worcester, Mass.—Folder announcing the entrance of this company into the automobile trade with a line of stamped sheet metal specialties.

The Brew-Hatcher Company, Cleveland, Ohio.—Pamphlet illustrating their new automobile parts.

George M. Beringer, Camden, N. J.—Leaflet regarding his anti-freezing solution.

The Sturtevant Mill Company, Harrison square, Boston, Mass.—Catalogue of the Sturtevant Leverless Automatic Motor Car.

The Knoblock-Heideman Manufacturing Company, South Bend, Ind.—Folder showing the company's product of spark coils, ignition magnets and plugs.

Winton Motor Carriage Company, Cleveland, Ohio.—Catalogue of Winton 1905 models.

The Moline Automobile Company, East Moline, Ill.—Folder giving advance information regarding the 1905 Moline cars.

J. N. Neustadt Company, 826 South Eighteenth street, St. Louis, Mo.—"Neustadt's Products," being an illustrated catalogue of the line of automobile parts and accessories made and handled by this company.

The Standard Welding Company, Cleveland, Ohio.—"What I Learned," being a booklet recording a visit to their factory.

The Marion Motor Car Company, Indianapolis, Ind.—Catalogue of the 1905 Marion "Air Cooled" cars.

A progressive automobile banquet is an innovation recently successfully tried by some motor car enthusiasts in Aurora, Ill. The guests rode from house to house, taking one course of the progressive dinner in each.

LEGISLATIVE AND LEGAL.

Prospects of Change in the New Jersey Law.

TRENTON, N. J.—We recorded some weeks ago that Assemblyman Harry Scovell, who is the father of the State automobile law in force in New Jersey, had stated before a meeting of an agricultural society that he would propose certain amendments to that law at the next session of the Legislature. Since then he has been at work on his new measure, and having enlisted the co-operation of Prosecutor Lloyd, of Camden, it now seems that some changes of the law will soon be made.

One of the most important changes contemplated is in empowering local officers to arrest any violator of the law without the formality of a warrant. As the law now stands it is necessary to have a warrant issued by some magistrate before an arrest can be made.

To assist local officers in identifying violators an amendment will be made requiring every automobilist to display on his machine the number of his New Jersey license while in that State and remove all other number tags. The law now existing makes no further provision for this than to require the placing of the license number on the machine.

The present law permits a speed of 20 miles an hour on country roads. An amendment will be made cutting down this speed considerably, but just how much it has not yet been decided.

Assemblyman Scovel says there is a sentiment, especially in Camden and Atlantic counties, to make it a misdemeanor to violate the law in any of its provisions. There are also a number of other amendments of minor importance under consideration.

That Wilmington Ordinance.

WILMINGTON, DEL.—The automobile ordinance question has arisen once more. A number of attempts were made during the summer to secure a measure which would be satisfactory to all concerned, but none are successful. At the present time City Solicitor Harman is at work on a bill which he contemplates presenting to the council at an early meeting. The ordinance will, it is thought, limit the speed of machines in the city limits to 10 miles an hour and will require each owner to pay a fee of $2 for the first year and $1 for each year thereafter and register his car with the city clerk. Licenses can be issued to any competent operators over twenty-one years of age. Before adopting any measure the council will undoubtedly hold a conference with members of the Delaware Automobile Association, to learn their views in regard to it.

CRAWFORDSVILLE, Ind.—At the annual meeting of the Montgomery County Farmers' Institute resolutions were passed demanding legislation to regulate the speed of automobiles on country highways. A committee of three was appointed to present the matter to the Governor for the purpose of inducing him to embody such a recommendation in his forthcoming message, and to impress on the legislators the importance of its enactment.

PITTSBURG, Pa.—Count Titus de Bobula, a young Austrian architect, was indicted last week by the grand jury for manslaughter for the killing of Mrs. Mary Stauffer, of Duquesne, last summer. The coroner's jury had exonerated him from blame about a week ago, but the woman's son pressed the charge, with the result noted. At the trial Judge Collier, in charging the jury, cautioned the members to beware of prejudice because the prisoner was wealthy and owner of an auto. He had the same rights as had the man who owned a horse or an ox cart. Like them, also, he was amenable to the laws.

CHATTANOOGA, Tenn.—Chief of Police Hill has given strict orders to the police department to enforce city ordinance No. 1,204, which restricts the speed of automobiles on the streets and also requires owners to register cars in the auditor's office.

CHICAGO, Ill.—A new ordinance, designed to put an end to all litigation between the city and park boards and the autoists, has been drafted by a committee from the Chicago Automobile Club under the supervision of Sidney C. Gorham. The terms have not been made public as yet, but it is believed that the tentative ordinance is designed on lines conservative and without radical changes from the present ordinance. Copies have been sent to the presidents of the three park boards, who have been invited to meet at the city hall and confer with the city officials and Mr. Gorham in regard to it.

LOWELL, Mass.—The case of the Packard Motor Car Company vs. H. B. Shattuck et al., for $1,864.96, with interest, was heard in the Superior Court Thursday before Judge Stevens. The question at issue was whether or not E. H. Shattuck was a partner of H. B. Shattuck. After hearing testimony Judge Stevens found that a copartnership existed. The alleged debt was for automobile supplies.

ST. LOUIS, Mo.—Motorists are aroused over the law which is in force which requires them to pay a license fee of $10 a year. No discrimination is made between cars used for private purposes and those used for hire. They contemplate some action which will remedy the matter.

LOUISVILLE, Ky.—After having made an assignment on November 26, the Motor Vehicle Company have consented to be adjudged bankrupt. A petition for such action had been filed with Judge Evans by the C. C. Stoll Oil Company, Albrecht & Heick and the Louisville Gunning System, who together hold claims aggregating $1,000. J. B. Baskin was appointed referee.

ELYRIA, Ohio.—F. E. Bowle, of Cleveland, was arrested last week as the result of a telephone message from Rocky Ridge, which stated that a rural mail carrier had been run down by an automobile which was proceeding toward Elyria and resembled that of Mr. Bowler.

CHICAGO, Ill.—Myron Nite and William Knight have been arrested on complaint of Jacob Rosenstein, who charges them with having stolen his automobile. A number of thefts of this variety have occurred in Chicago of late.

WORCESTER, Mass.—The Automobile Club at a recent meeting adopted the following resolution: "Resolved, That it will be for the welfare of every driver of any kind of a conveyance that every vehicle traveling after dark should be provided with lamps, whether milk wagons, carriages or automobiles, for the safety of everyone using the highways after dark." The resolution will be sent to Dale Carlton, Rochdale, chairman of the legislative committee, with instructions to use such means as are deemed proper by the committee in obtaining legislation to that effect.

BUFFALO, N. Y.—Insurance Agents Richard L. Wood and Hall & Park have been allowed a claim of $514, made in the bankruptcy court against the defunct Conrad Motor Carriage Company. The company went bankrupt and previous to the insolvency the agents insured the factory, but were not paid the premiums.

MIDDLETOWN, Conn.—Suits aggregating $39,000 have been brought against the Eisenhuth Horseless Vehicle Company by Mary G. Read, of New York; L. O. & E. S. Davis, of Middletown, and Frank A. Fox, of New York. The last named alleges a breach of contract and claims $8,000 damages.

KALAMAZOO, Mich.—Motorists are dissatisfied with the present automobile ordinance, which provides a maximum speed of 6 miles an hour. A speed of from 10 to 12 miles per hour is asked by the owners.

COLUMBUS, Ohio.—Campbell Chittenden, who was fined $25 for driving his automobile at a greater speed than the city ordinance permitted, appealed the case to the State Supreme Court, which decided that Chittenden could not file a petition in error to the finding of the Circuit Court, and consequently upheld the imposed fine.

LOUISVILLE, Ky.—At a meeting of the city council on December 8, Alderman Harris asked leave to withdraw the ordinance recently introduced by him regulating the driving of automobiles within the city limits. Aldermen Knecht and Embry objected, saying the ordinance had some good features in it which they desired to see enforced. The ordinance went to the revision committee.

Club Notes

DELAWARE A. A.

A meeting of the association was held on Thursday, December 1, and the work of organization completed. By-laws were adopted and certain proposed legal measures regarding the use of automobiles fully discussed.

IOWA A. C.

At a meeting held on December 5 a constitution was adopted, and the following officers chosen: President, G. B. Hippee; first vice president, D. B. Fleming; second vice president and captain, W. J. Riddell; secretary, W. L. Kearn; treasurer, Charles Denman; consulting engineer, F. S. Dusenbury.

SPRINGFIELD A. C.

At a recent meeting the club rejected the offer of the Colonial Club to rent its clubhouse, as the idea of having city club rooms did not meet with favor. It was voted to co-operate with the Y. M. C. A. in a series of lectures on the care and operation of automobiles, projected by the latter association.

MASSACHUSETTS A. C.

The new addition to the clubhouse, which has been in use for some months, was thrown open officially on Friday evening, December 9. Dinner was served, followed by a reception and musical entertainment. The committee of arrangements consisted of Messrs. Stephen Sleeper, Harlan W. Whipple and Dr. J. C. Stedman.

BURLINGTON A. C.

At the meeting on Monday, December 5, a committee was appointed to appear before the State Legislature on the following day to advocate certain changes in the automobile bill under discussion. The committee consisted of the president of the club, Dr. D. C. Hawley, and the following members: Dr. J. E. Taggart, Dr. L. Hazen, Col. H. W. Hall and E. A. Brodie.

A. C. OF MARYLAND.

The club, which has had a very prosperous season, now numbers nearly half a hundred members. The work for highway improvement is still going on. The following are the officers whose term expires at at the time of the annual business meeting on January 16· President, Mr. William Keyser, Jr.; vice president, Mr. William F. Belding; secretary, Mr. C. Warner Stork; treasurer, Mr. Ernest Knabe, Jr.

N. Y. M. C.

At a meeting of the club held in Bretton Hall, on December 9, Mr. Charles H. Hyde was elected president. Mr. Hyde had been officially named for first vice president, but headed an opposition ticket, which was carried. The other officers elected were: First vice president, S. A. Miles; second vice president, W. J. P. Moore; treasurer, A. L. McMurtry; secretary, L. R. Smith. Directors—Angus Sinclair, S. J. Griffin, Joseph B. Cowan and K. C. Pardee.

A. C. A.

The board of governors, acting for the club, has offered a reward of $100 for information resulting in the arrest and conviction of the persons who, after running down a farmer in his wagon in Pelham Parkway, left him by the roadside in a seriously injured condition. The committee appointed some time ago to consider the erection of a club house and garage has reported in favor of the project, and has been superseded by another, which is to develop the plans. A special meeting will be called to consider its action.

A. A. A.

At a meeting of the board of directors held on December 6 candidates for election at the annual meeting on January 16 were nominated as follows: President, Harlan W. Whipple, New York; first vice president, John Farson, Chicago; second vice president, Judge Hotchkiss, Buffalo; third vice president, M. Johnson, Los Angeles, Cal.; treasurer, G. E. Farrington, Orange, N. J., and secretary, C. H. Gillette, New York. The directors named are D. H. Morris, W. C. Temple, Elliott C. Lee, Windsor T. White, A. R. Pardington, H. L. Lippitt and C. G. Burgoyne. An amendment to the constitution was prepared. by which every affiliated club numbering fifty members or more shall have representation on the board of directors. Four would still constitute a quorum, however, as at present. Hereafter the second and third vice presidents will be included in the board. The date of the regular meeting has been changed from the first Tuesday to the first Monday in the month.

Entries for the Gordon Bennett Race.

The first formal entry for the contests which are to determine the American team in the coming Gordon Bennett Cup race is that of the Pope Motor Car Company, who have nominated a car of 90 horse power. The report that the French authorities, having refused to allow the race to take place on French soil, it will be run in either Germany or Italy, is said by the committee of the A. C. of France to be without foundation, as the request for the necessary permission has not yet been made, and they are assured that when it is it will be granted.

Exports for October.

During October, 1904, automobiles and parts to the value of $130,891 were exported. For October, 1903, the figure was $119,131. The figures for the ten months ending October, 1902, 1903 and 1904 are $970,610, $1,311,960 and $1,576,877, respectively.

Commercial Vehicle Notes.

The Kansas City Laundry Company has adopted automobiles for its delivery service.

J. F. Royer has recently ordered a motor stage for use on his passenger transportation line between Greenwood and Grand Forks, B. C.

The Board of Public Service of Cincinnati are considering the advisability of adopting automobile ambulances for the new general hospital.

Batcheler & Barnhart, of Boston, have inaugurated a system of sightseeing automobiles in New Orleans, La. The Hotel Grunewald, of that city, has also started a similar enterprise under the direction of Charles U. Kennedy.

C. J. Hudson, of Covington, Ga., has completed a steam motorbus, which is to be in used in the operation of an automobile stage line between Clarkson and Atlanta. The car is of 20 horse power and has a seating capacity for thirty persons, it is said.

New Incorporations.

Cincinnati Oldsmobile Company, Cincinnati, Ohio. Capital, $10,000. Incorporators: J. T. Montfort, A. W. Granger, Sid. Black, A. C. Davis, Wade Cushing.

Curtis Auto Company, Brooklyn. Capital, $1,000. Incorporators, Charles G. Curtis, V. Curtis, Alice W. Curtis.

Dover Garage Company, Dover, N. J. Capital, $10,000. Incorporators: Robert A. Bennett, Charles E. Clark, Hiram P. Hall.

Automobile Importing Company, Chicago. Capital, $10,000. To manufacture automobiles. Incorporators: C. W. Gillett, H. L. Brand, B. F. Webb.

Virginia Automobile Company, Norfolk, Va. Capital, $25,000. Officers: President, Moses G. Nusbaum; vice president, J. W. McCarrick; secretary, J. Roy Collins; treasurer, J. J. Hennelly.

Burns Manufacturing Company, New Haven, Conn. To manufacture automobile fittings. Capital, $500,000. Incorporators: W. S. Burns, Samuel C. Morehouse, Aaron A. Alling.

Engineers Organizing.

A. L. Riker, George W. Wesley, Karl Almquist, Henry G. McComb and J. Frank Duryea, who form the organization committee of the embryonic Engineers' Branch of the Licensed Association of Automobile Manufacturers, met at the Engineers' Club, New York city, on December 10, and decided to carry out the project, which was proposed a few months ago. A general meeting of all superintendents and engineers connected with the factories of members of the association has been called for January 19, to be held in New York city, when organization will be perfected.

MINOR MENTION

The Chelsea, Mass., Automobile Exchange are building a new garage.

The Flint Upholstering Company have recently moved their plant to Detroit, Mich.

Norcross & Shiland, of Worcester, Mass., have taken the Pope-Toledo and Autocar agencies.

The New York agency for the Pungs-Finch car has been taken by the Duerr-Ward Company.

The Bennett-Bird Company, Chicago agents for the Premier car, have moved to 1404 and 1406 Michigan avenue.

James Brown Potter, of New York, with a party, has started on an exploration trip through Southern Mexico in motor cars.

W. S. Burns has organized the Burns Manufacturing Company in New Haven, Conn., to manufacture automobile parts.

The Napier Motor Car Company, of Boston, have nearly completed their plant, and expect to begin building cars by January 1.

The agency for Thomas cars in New Haven, Conn., will be handled by the Reichert Automobile Company during 1905.

Henry Ascher has purchased a plot of land on Delmar boulevard, St. Louis, upon which he expects to erect an automobile sales building.

Jesse O. Norcross and H. E. Shiland, of Worcester, Mass., have formed a partnership, and will engage in automobile sales and garage business.

According to a Washington report Senator Latimer has given up hope of having his good roads bill passed at the present session of Congress.

The Oldsmobile Company of New England has been purchased by Charles P. Adams, who will continue the business at 239 Columbus avenue.

A syndicate of Philadelphia capitalists is said to have leased the old Shimer factory, near Bethlehem, Pa., to use in the manufacture of automobiles.

William M. Gage has purchased what is known as the rubber factory building in the north part of Saratoga Springs, N. Y., and will convert it into a garage.

The Rhode Island Motor Car Company have recently opened a new garage at 69 Broad street, Providence. They have the Franklin agency for 1905.

W. L. Hibbard, formerly Chicago sales agent for the Studebaker Automobile Company, has been appointed sales manager for the Buick Motor Company, of Flint, Mich.

A day course will be started in connection with the Boston Y. M. C. A. automobile school if a sufficient number of pupils can be secured before January 1. The work of the school has been extended recently by the addition of practical lessons on the garage floor.

The Amon-Pierce Automobile Company have opened a new garage in the building formerly occupied by the Leggett Manufacturing Company, of Syracuse, N. Y.

The Great Western Manufacturing Company, of La Porte, Ind., an old bicycle concern, will place upon the market for 1905 a light touring car and a delivery wagon.

William L. Colt, formerly general sales manager of the Federal Manufacturing Company, has been appointed manager of the new Cleveland Automobile Company.

Charles A. Fox, of Syracuse, N. Y., has forwarded papers of incorporation of a company with a capital stock of $450,000, which is to manufacture a touring car.

W. K. Vanderbilt, Jr., has been named by the Automobile Club of France as its representative on the commission in charge of the competition for the Glidden touring trophy.

The Duff Manufacturing Company, of Allegheny, Pa., write us that they have been awarded a gold medal by the superior jury of the St. Louis World's Fair on Barrett lifting jacks.

A two story addition has recently been made to the plant of the Milwaukee Rubber Company, Cudahy, Wis., to provide space for an automobile tire department—a new departure for this concern.

A new branch office of the Knox Automobile Company, of Springfield, Mass., will soon be opened in the Rich Building, Main and Tupper streets, Buffalo, N. Y., with Francis L. Thomas as manager.

The Knox Automobile Company, of Springfield, Mass., has loaned the mechanical department of Illinois State University one of its touring cars to be used for experimental and demonstration work.

The garage of the Oldsmobile Company, of Cleveland, Ohio, at 41 Euclid avenue, was destroyed by fire on December 9. The building contained about fifty cars at the time, nearly half of which were burned.

President Hedges, of the Iowa State Traveling Men's Association, stated at a recent meeting that automobile accidents were responsible for 10 per cent. of the death losses which the organization has paid during the past year.

The selectmen of Becket, Mass., have agreed to permit Cortland F. Bishop to expend the money he has raised by private subscription for repairs to Jacob's Ladder, the road over Becket Mountain, which for some time has been practically impassable to automobiles.

The Rapid Motor Vehicle Company, of Detroit, Mich., formerly a copartnership, have filed articles of association with Albert Marx, Barney Finn, Celia Grabowsky and Max Grabowsky as stockholders. The capital stock is $100,000.

Contracts have been let for the erection of the new plant of the Knox Motor Car Company, of Springfield, Mass, which will be located at the corner of Hooker and Becket streets. March 1 is the date set for the completion of the buildings.

John Biegger, Jr., late president of the State Bank of Winfred, S. Dak., has entered the automobile trade in Sioux Falls, and will do business under the name of the Sioux Falls Auto and Supply Company. He is building a garage and salesroom at the present time.

The Duquesne Construction Company has organized in Jamestown, N. Y. The building formerly occupied by the Straight Manufacturing Company will, it is planned, be reopened by the new concern by January 1, for the manufacture of cars. The company is capitalized at $300,000.

The Binghamton (N. Y.) Automobile and American Car Company has been formed to engage in a general automobile business. The officers are as follows: Frank H. Beach, president; E. M. Hanrahan, vice president; John M. Davidge, secretary and treasurer, and R. W. Whipple, manager.

The business of the Miller-Knoblock Electric Manufacturing Company, of South Bend, Ind., has been taken over by the newly organized Knoblock-Heideman Manufacturing Company. Otto M. Knoblock is president; William H. Miller, vice president, and G. H. Heideman, secretary and treasurer.

J. E. Long and John Crawford, of Massillon, Ohio, have organized the Long-Crawford Automobile Company for the purpose of making motor cars. Their car, which will be known as the Boss, will, it is said, be propelled by a four cylinder air cooled motor of 24 horse power, and equipped with a side entrance tonneau body.

The Stoddard Manufacturing Company, of Dayton, Ohio, who have finished the first of a number of cars which they proposed to make, have transferred their rights in the same to the Dayton Motor Car Company, which has been organized recently and will manufacture them instead. The car will be known as the Stoddard-Dayton.

The Philadelphia agency for Peerless and Stevens-Duryea cars will be handled during the coming year by the Eastern Automobile Company, which has been recently incorporated in that city by M. E. Brigham, A. B. Cumner, George T. Thompson, H. K. Buck and J. R. Maynes. Temporary offices are at 712 Girard Trust Building, but they expect to open a garage and salesroom soon.

The Cleveland Motor Car Company, of Cleveland, Ohio, with offices at 388 Erie street, has been organized, and has planned to build a lot of light touring cars for 1905, which will be propelled by four cylinder vertical water cooled motors of 18 horse power, and three speed direct drive transmissions with bevel gear driven rear axles.

MOTOR VEHICLE PATENTS..

United States Patents.

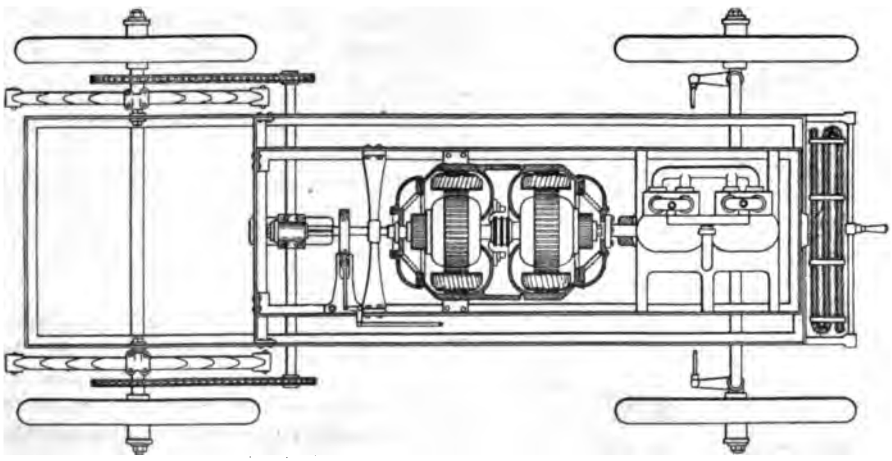
776,513. Automobile Spring.—Louis A. Hill, of Washington, D. C. December 6, 1904. Filed May 6, 1904.

This is a system of spring suspension comprising a three point suspension on each side of the frame, arranged to equalize all loads and absorb vibration. The springs are of the semi-elliptical pattern, one of them being mounted on each of the axles, in the usual way, and linked to a third, which is mounted in an inverted position at the centre of the frame. The suspension at the front of the machine is preferably by a quarter-elliptic spring instead of the usual pump handle or spring horn.

776,557. Electric Transmission Mechanism.—Charles J. Simonds, of Schenectady, N. Y. December 6, 1904. Filed May 5, 1904.

This patent refers to an improved form of electrical transmission, in which both the fields and armature of the generator are in rotation. The improvement consists in the method of enclosure and the manner in which the various parts of the mechanism are supported.

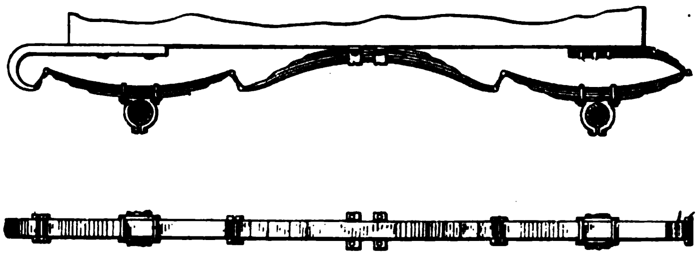
The field frame of the generator is coupled directly to the driving shaft of the gas engine, and is so shaped as to almost entirely enclose the armature, at the same time carrying a roller bearing for the armature shaft. The armature, which overhangs that portion of the field frame which contains its shaft bearing, is keyed to the shaft, and rotates within the field housing, but independently, so far as any mechanism is concerned, of the rotation of the field. A second armature, similar in structure to the first, is also keyed to the shaft, and constitutes the motor or driven member of the clutch. The motor fields are stationary, and are housed by a casing which extends around the armature as in the case of the generator, and similarly forms a bearing for the armature shaft. A prolongation of this housing extends over the collector rings, through which the generator fields are supplied with current, and forms a close running fit with the generator housing. The mechanism is thus wholly self contained, self supporting, and dustproof.



No. 776,557.

776,561. Automobile Driving Gear.—Peter Steinhauer, of St. Louis, Mo. December 6, 1904. Filed March 10, 1904.

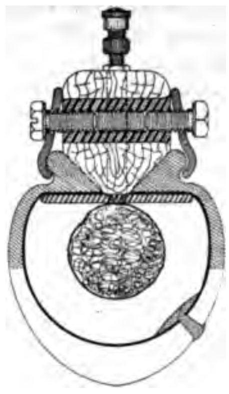
A driving gear in which the engine effort is distributed to all four wheels. Steering is accomplished by two diverging shafts geared together, and threaded to receive non-rotatable sliding nuts. Any movement of the gearing causes these to travel in opposite directions, thus altering the positions of two strut rods which are linked to the ends of the swiveled steering axle. A universal connection is provided at the centre of the steering axle to allow for deflection of the wheels to conform to inequalities in the road. The differential effect is secured by a clutching mechanism upon each of the wheels. Whenever the steering gear is deflected in either direction, the clutches in the two wheels at the inside of the curve are released, thus leaving the wheels free to turn loosely upon their axles.



No. 776,513.

776,650. Pneumatic Tire.—Charles E. Duryea, of Reading, Pa. December 6, 1904. Filed January 16, 1904.

A special form of felly and rim are used in connection with a cover, somewhat similar in structure to the clincher type of shoe, to form a tubeless tire. The outer edges of the wooden felly are beveled to a truncated pyramidal cross section which is surmounted by a flat steel rim. The tire is adapted to fit into the crevice thus formed, and is held firmly in place by clamping plates, one on either side, which are fastened to the wheel by stud bolts passing through the rim. The transverse pressure of these plates forces the tire upward against the rim and inward against the felly. The stresses due to inflation and load upon the wheel serve to press it more firmly into place and to increase the efficiency of the air joints. An endless inner filler is placed within the tire and close to the rim, to shield the tire from the rim, and cushion the wheel, to a certain extent, in case of deflation. The clamping plates are made in segments, so that repairs may be made by simply removing one side of the tire for a portion of its length. A filling tube is set in the felly entirely independent of the tire, to be used when inflating and in introducing a sealing solution.



No. 776,650.

776,570. Protective Cover for Tires.—Roughsedge Wallwark, of Manchester, England. December 6, 1904. Filed September 12, 1904.

An anti-puncture, non-skidding tire cover is made up of a number of strips or segments of leather or other suitable material, their ends being in the form of flaps or tags for use in attachment to the tire. The several segments are joined together upon the tread portion of the tire, by means of metallic plates, which are provided with spikes or prongs, extending through and riveted over, upon the back of the segment. The unevenness of the plates gives the desired tractive effort, while the flexible segments serve to retain the resiliency of the tire. If

necessary, spikes may be secured to the plates projecting outwardly, and thus increasing the tractive effort.

776,705. Induction Coil.—Richard Varley, of Providence, R. I. December 6, 1904. Filed December 20, 1903.

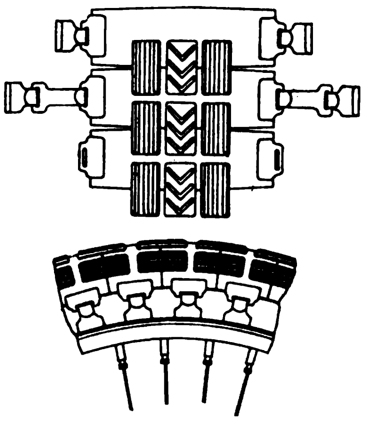
This device is an induction coil having two vibrators so arranged that either one may be used independently of the other. In the preferred arrangement one of the vibrators is located at each end of the coil, and a three point switch is used for directing the current to either of them at will. By this means, while one of them is in action, controlling the flow of the primary current in the usual way, the other, though kept in continual vibration by the intermittent action of the magnetic field, is idle electrically. Hence its platinum points are being rapidly hammered together by the vibration. The ultimate effect of this is to clean from them the corrosive scale which comes from the electric arc. This means is provided for automatically cleaning the contacts without stopping the motor, and also a duplicate vibrator, ready for instant use in case of emergency

776,944. Traction Train.—Daniel Brennan, Jr., of Haverstraw, N. Y. December 6, 1904. Filed June 15, 1904.

A traction and steering mechanism for road trains is so continued that each vehicle follows in the tracks of its leader. This is accomplished by swiveling both axles of each unit, and so interconnecting them that swinging one will tend to deflect the other until their two axes intersect at the centre of curvature of the road at that point. This is brought about by connecting links and springs which are equalized only when the axles are in parallelism.

The connection between the units is by means of links fastened to pins in the buffers of the cars. As the leading vehicle swings in rounding a curve, this draw bar or link swings appositely until it brings up against a step upon the buffer, when it begins to exert a levering action on the front axle of the following car, thus guiding it into the proper course. The swinging of the draw bar between the steps is opposed by a pair of heavy springs, which are equalized only when the two vehicles are traveling in the same course The train may be guided from either the front or rear ends, and the tractor may be either in front or behind. Special provision is made by means of which the four wheels of any one of the vehicles may be run out of track to avoid the cutting up of soft roads.

776,404. Clutch.—Charles C. Keyser, Newport News, Va. November 29, 1904. Filed April 18, 1904.

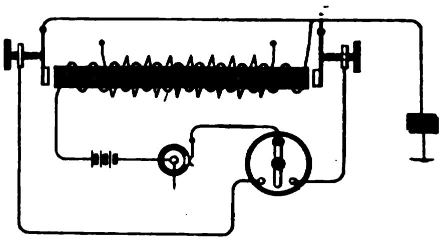


No. 776,570.

776,406. Vaporizer for Hydrocarbon Engines.—Elden P. Lamb, Rockland, Me. November 29, 1904. Filed November 23, 1903.

776,422. Lubricator.—James Powell, Cincinnati, Ohio. November 29, 1904. Filed December 23, 1903.

776,463. Vehicle Wheel.—Emery Gates, Modesto, Cal. November 29, 1904. Filed January 4, 1904.



No. 776, 705.

776,537. Lubricating Axle. — Herbert Nicholson, Chicago, Ill. December 5, 1904. Filed February 12, 1904.

776,542. Carburetor.—Francis Paul, Jr., Sorel, Canada. December 5, 1904. Filed August 7, 1903.

776,586. Hot Tube for Gas Engines.—John V. Ebel and Walter J. Hudson, Pittsburg, Pa. December 5, 1904. Filed January 7, 1904.

776,637. Impulsive Steam Engine.—George A. Aldrich, San Francisco, Cal. December 5, 1904. Filed September 6, 1904.

776,644. Friction Clutch.—Michael R. Conway, Cincinnati, Ohio. December 5, 1904. Filed September 2, 1903.

776,656. Tire.—Charles G. Fawkes, Denver, Col. December 5, 1904. Filed September 19, 1903.

776,697. Puncture Plug for Pneumatic Tires.—Fred A. Sieverling, Kansas City, Mo. December 5, 1904. Filed April 4, 1903.

776,700. Sparking Device for Internal Combustion Engines.—Charles E. Sterne, San Diego, Cal. December 5, 1904. Filed May 2, 1901.

776,708. Valve Gear for Explosive Engines.—Charles H. Way, Lansing, Mich. December 5, 1904. Filed December 28, 1903.

776,773. Roller Bearing.—Thomas A. Blakely, Flesherton, Canada. December 5, 1904. Filed June 25, 1904.

776,800. Explosive Engine.—Ferdinand J. Rochow, Brooklyn, N. Y. December 5, 1904. Filed December 7, 1901.

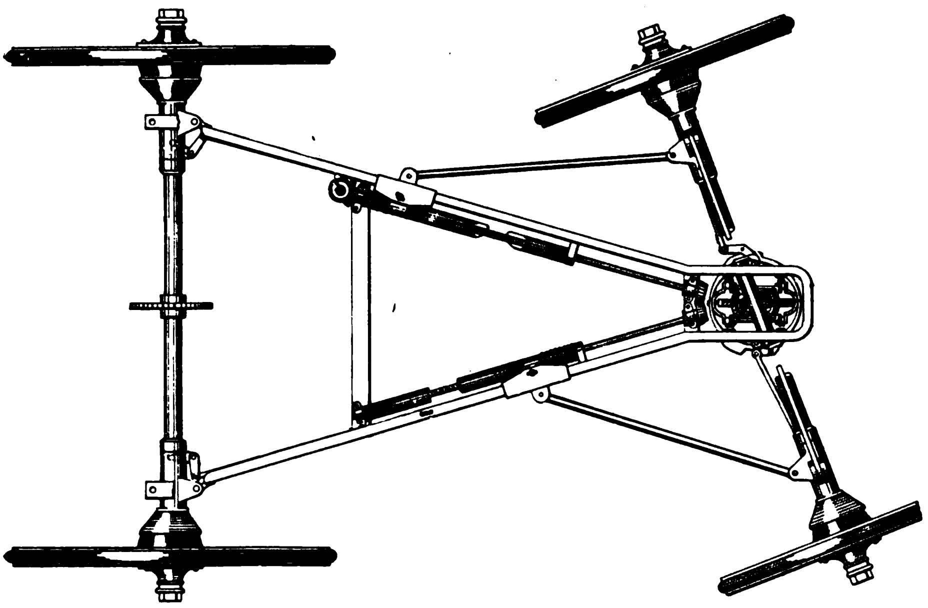
776,806. Friction Clutch.—Allan C. Sargent, Graniteville, Mass. December 5, 1904. Filed November 21, 1902.

776,809. Steam Logging Engine.—Gustave Sipler, Minneapolis, Minn. December 5, 1904. Filed June 4, 1904.

776,900. Lubricator.—Samuel B. Forse, Pittsburg, Pa. December 5, 1904. Filed April 13, 1904.

776,953. Grease Cup.—Frank Soler, San Bernardino, Cal. December 5, 1904. Filed January 14, 1904.

776,982. Carbureting Apparatus for Explosive Engines.—Joseph D. Anderson, St. Marys, Ohio. December 5, 1904. Filed January 4, 1904.



No. 776,561.

Out-of-town subscribers of The Horseless Age, who intend visiting the New York Automobile Show, are requested to communicate with the Editor, if possible mentioning the name of the hotel at which they will stop when in the city.

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The Ferry Question.

The case of the United States against the ferryboat Texas came up for trial in the United States District Court in New York during the past week. This is a test action growing out of the ruling of the Department of Commerce and Labor, made last summer, that gasoline automobiles cannot, under the laws governing the carriage of gasoline on passenger vessels, be driven onto and off ferryboats under their own power; it being held that the phrase "provided that all fires, if there be any, shall be extinguished" covered the spark necessary to produce the explosion in the gasoline motor, and that this must therefore be cut off before the car is run aboard. The case was brought by agreement between the ferry company, owners of the boat mentioned, and the United States District Attorney, in order to secure a court ruling which might serve as a guide in future.

Among the Government's witnesses were two college professors, who, with the help of drawings and sketches, proved, to the satisfaction of the prosecuting attorney, at least, that gasoline automobiles are a menace to safety when allowed on ferryboats. They showed how, when the spark in a gasoline motor is shut off, the suction of the piston, as the motor continues to run for a time, draws over an explosive mixture, which is conveyed to the muffler, where, when the motor is again started, it may ignite and shoot forth flames, which may set fire to inflammable material which may happen to be near. This was considered good evidence for the prosecution, especially as the defense offered none to contradict it. In fact, it cannot be contradicted. Neither can it be denied that a match, which may be thrown by some careless smoker, who may happen to be aboard a ferryboat, may remain burning during its flight, and, striking on some inflammable material which may happen to be near, set fire to it. This is as likely as the other possibility, yet we have no laws prohibiting smoking on ferryboats. That the degree of danger in the two cases is about equal is shown very clearly by the scarcity of accidents attributable to either cause. In fact, during the three years previous to the discovery that the law was being constantly violated by the ferry companies, so far as our knowledge goes, not a single accident occurred which had its origin in the source of danger pointed out by the professors.

The danger inherent in any practice can be used as an argument against its employment only so long as the possible evil consequences outweigh the possible advantages to be derived from it. When the reverse is true, the attending danger must be considered as a necessary evil, and precautions taken to reduce it to a minimum. This holds true in connection with gasoline motor cars on passenger ferryboats, as it has in all similar cases in the past, and since it has been shown, as is herein pointed out, that the danger in this particular case is, at most, very small, and since a return to the old custom would be welcomed by all most directly concerned, it would seem that a legal technicality entirely without justification is alone responsible for the existing condition of affairs.

If the decision in the case mentioned is not favorable to motorists, nor to the ferry companies, for they are as greatly inconvenienced by the present state of things, both may hope for relief in an amendment to the statutes which has been prepared and will be presented, it is thought, at the present session of Congress.

The Return of the Belt Drive.

There is understood to be some tendency among foreign manufacturers of the cheaper grade of light runabouts to

revert to non-positive forms of speed changing mechanisms, and it is said that friction disc and belts are again assuming a certain degree of prominence.

It is interesting to conjecture whether these devices are likely to figure in the construction of the very low priced runabouts which may be expected to be put upon the market by American manufacturers when the automobile movement becomes more generally popularized among the less wealthy classes.

Both the friction disc and the belt system were proposed very early in the history of the automobile art, and were embodied in usable forms in quite a number of makes of cars, but have since been almost entirely abandoned in favor of more positive mechanisms. It is to be remembered that quite a number of the early ideas which were applied to motor car construction, and which were discarded as impractical in the earlier forms of their development, have been taken up anew in the light of later knowledge and perfected to a usable point. A notable example of one of these ideas, which, after having been shelved as a failure, has been developed to a high degree of efficiency, is the air cooling system. Whether the non-positive change speed device possesses merit which can be brought out by modern methods of design and manufacture to a degree which may render it a successful competitor of the planetary gears now so generally used is an interesting question.

The single friction disc change speed device possesses an almost ideal degree of simplicity. A friction wheel carried upon a shaft and capable of being brought into contact with the specially prepared face of the flywheel at any distance from its centre, together with a sprocket connection between this shaft and the rear axle, describes the complete device. By its use a very wide variation in speed ratio, by infinitesimal steps, between the motor speed and that of the rear axle may be obtained. A forward or reverse motion of the driving wheels is obtainable, dependent upon whether the friction wheel is in contact with the flywheel upon one side or the other of its centre. No clutch is required, as the pressure of the friction wheel against the disc of the flywheel and their separation produce respectively the effect of clutch engagement and disengagement respectively. There are no gears concerned in any way and there is nothing delicate about the arrangement.

As to the efficiency of a frictional arrangement of this sort there is little accurate information, but it is generally believed to be rather low, especially when giving its greatest reduction ratios. Under such conditions the path of contact upon the disc, which the wheel is supposed to follow, is one of great eccentricity, and, as the actual contact between the two is more than a mere theoretical point, much slip and wear actually results. The efficiency of transmission at the small reduction ratios is probably much better, but it can never be so great as that attainable with the direct drive of a planetary gear. Indeed, in a recent foreign design the disc and wheel are cut out of service when the car is running at its highest speed, relative to the engine, and a direct drive is employed. The severe end thrust upon the engine shaft and heavy side pressure upon the bearings of the friction wheel tend to reduce the efficiency of power transmission by this method. A friction disc change speed device of this character should be extremely inexpensive to manufacture, but it remains to be seen whether the sum of its advantages will be found to outweigh its low efficiency and the lack of positiveness, which is generally admitted to result from differences in condition of the frictional surface, consequent upon too much or too little lubrication or the effects of wear. If it is applicable to any type of car, it will probably be to the light runabout of small engine power.

One of the real advantages possessed by the disc drive is the infinite multiplicity of speed ratios which it can furnish, and which should enable the motor to be most advantageously loaded under all road conditions. Belts running upon stepped pulleys do not possess this merit, but provide definite ratios of speed between engine and rear wheels, perhaps three in number. The combination of belts, pulleys and shippers is rather inexpensive to manufacture, practically silent in operation, and forms an arrangement which possesses a certain crude endurance, as well as being easily repaired. If completely protected from the action of the weather and from the collection of oil, and if the material of the belts is free from excessive stretch and kept well dressed, a fair degree of positiveness of action may be secured. Nevertheless, it would be rather surprising if belts should be again resorted to, considering the present high development of the planetary gear and the possibility of cheapening, for popular use, some form of the sliding pinion gear.

Cheapening of the cost of production would seem to be the only motive which could tempt manufacturers to adopt either of these forms of non-positive drives, and it is doubtful whether the buyers of even the cheapest types of American car would put up with anything less than an arrangement having substantially the advantages of those applied to higher priced vehicles.

The Shape of the Bonnet.

In the shape of the bonnets fitted to the new 1905 models so far shown a distinct improvement is seen. In nearly all cases they are of the square type, which accords with the present fashion, and in some cases very much like those seen on the same cars last year. Slight changes have been made, however, which tend to improve the naturally ungraceful lines of this type of bonnet and to give to it a neater and less bulky appearance.

The square bonnet came into existence with the honeycomb cooler, and it is largely through the continued use of this type of cooler or its equivalent that the shape has been retained. At first it was received with considerable criticism, especially at the hands of the artistically inclined, and the disappearance of the long, sloping hood was the cause of considerable regret. We are now accustomed to it, however, which, coupled with the fact that the present representatives of the type are refinements of the crude examples first seen, makes it acceptable to nearly all.

The chief mechanical reason for continuing its use is that it affords a position for the cooler in which this part is protected to a large extent from dust and dirt and yet subjected to a good natural draught. The arrangement also provides easier access to the forward end of the crank shaft than when the cooler is hung below the frame, and reduces the lengths of piping in the circulation system to a minimum.

So far as the accessibility of the motor is concerned it would seem that something is lost, for the cooler in front, the mud guards over the front wheels on either side, and the dash at the rear enclose it in a fenced in space, as it were,

and considerable reaching must be done to get at the lower parts. With the front clear, as is the case when the cooler is hung below the frame, or, as in a certain foreign car, located just in front of the dash, these parts, except in the case of the largest motor, can be reached with comparative ease from that point.

It would not be surprising if the arrangement last mentioned came into more general use, for it has been shown that a sufficient circulation of air can be maintained through the cooler when in this position to ensure successful cooling, and greater protection afforded it from dirt. Besides greater accessibility is secured and the use of a sloping hood made possible.

The most pleasing feature in connection with the general outline of the new cars is the absence of the false bonnet, which was in most cases merely an abortion and whose only reason for existence was a desire to imitate and to make it appear to be what it was not.

Wheel Base.

Within a comparatively few years the accepted length of wheel base for motor vehicles has increased very rapidly. From rather less than 5 feet during the early days of the industry it has been gradually augmented until 8 feet or over is not considered unusually long, and 9 feet by no means extraordinary. The improvement of riding qualities which has resulted from this increase of length, due to the very perceptibly increased time period which elapses between the respective actions of the front and rear springs when meeting any given road obstruction, has immeasurably enhanced the comfort of automobiling. Greater roominess also characterizes these long, modern cars, and has rendered them veritable vehicles of luxury.

Just at present many manufacturers who are adopting the side entrance tonneau are increasing their wheel bases in order to enable this innovation in body design to be carried out, and it would be interesting to know whether the limit of length of wheel base has been reached or whether it is to still further increase.

During this period of wheel base extension the manœuvring ability of cars has decreased rather than increased, as judged by the diameter of the circle in which they may be turned, and it is probable that further increase in wheel base may be somewhat discouraged by considerations involving the large spaces necessary for the turning of excessively long cars.

Upon narrow country roads, consisting of a single carriage track, ditched or banked near each side, such as are frequently encountered in touring, a great deal of "backing and filling" is required in turning a large car about, and considerable distances sometimes have to be traversed in order to find a favorable place for this operation. In crowded garages much difficulty is experienced in turning long cars, the steering wheels of which cannot be deflected at a liberal angle. It is believed that greatly increased convenience would result from the ability of the operator to deflect the steering wheels of his car through a wider angle than customary, and it would seem that the maximum steering wheel angle should at least be increased with the extension of the wheel base which is and has been going on. Otherwise cars will be produced in which manœuvring power does not compare favorably with other manageability features, such as ability to stop quickly and speed control.

Yielding Mediums in Transmission Systems.

Numerous attempts have been made to introduce into the transmission systems of motor cars some means of reducing the shock resulting from the sudden application of the driving power. For the most part these have consisted of detail improvements in the construction of the clutch by which a gradual engagement of the friction surfaces may be obtained. They have taken a variety of shapes, including the placing of comparatively light springs beneath the surface of the leather so that only a small part is brought into engagement and the driven member slightly accelerated before the maximum driving effort is applied, and of so adjusting the clutch spring and shaping the friction surfaces that the device is capable of transmitting only the exact maximum of torque required to drive the car successfully. These expedients have only partially accomplished the desired results, for with them the skill of the operator is still an important factor. If he permits the clutch to engage rapidly its effectiveness as a shock absorber is largely lost, and the impact is transmitted through it to the end of the system.

To many designers it has seemed desirable to use other means than these modifications of the clutch, and they have, therefore, placed somewhere along the line of power transmission a yielding medium, which from its character prevents shocks of a certain predetermined maximum violence from passing through it. At least one American car is now equipped with a device of this kind, and the idea has to a certain extent been worked out in practice abroad.

Undoubtedly there is much to be gained if a medium of this sort can be successfully incorporated in the transmission systems of motor cars, but in order that it may fully accomplish its purpose at all times certain considerations regarding its construction and location must be taken into account.

It is evident that the device can have only a fixed positive driving capacity, that it will yield only under a given minimum of torque, and for lighter shocks will act as a positive coupling. It would therefore appear that it should be placed where the torque is most nearly uniform, which is, of course, between the motor and the change gear group. At this point the torque is not only more uniform, but is also lighter than at any other, which constitutes another reason for placing the yielding medium there, for the necessary strength may then be obtained with considerably less weight. That part of the transmission system between the change gear group and the driving wheels, through the various gear reductions, is subjected to a widely varying torque, with a maximum as many times greater than that at the motor as the ratio of reduction of the lowest speed. Hence, a yielding member made strong enough to withstand this maximum is likely to be too stiff to give sufficiently under the lighter shock which it may receive when a higher speed is in use.

Heretofore, in nearly all cases, springs alone have been used to furnish the yielding properties, but it is doubtful if they alone can accomplish the desired result, being too efficient, as it were. They give back, eventually, every pound of impact which they receive, and may, therefore, cause an uneven and irregular driving effect under the varying conditions of operation. For this reason it would seem that some spring and friction combination, such as is seen in the drawbars of railway coaches, might be evolved to meet the requirements.

The Doctor and the Motor.

On January 7, 1903, we published our Doctor's Number, which contained contributions from fifty-six doctors residing in various parts of the country. In these were recorded the experiences of the writers in connection with the use of motor cars in their professional work. A vast majority of them were favorable to this use, and it seemed that sufficient evidence was presented to show that for the doctor's use especially the motor has much to commend it.

Since then two years have passed, during which time the experience of the writers has been extended, in most cases more than doubled, so that there has been ample opportunity for opinions to change. It was with a view to ascertaining to what extent, if any, and in what way the intervening time has altered the judgments of the writers that we addressed to each a circular letter which requested an answer to the following questions: Are you still using the automobile in your practice? If discontinued, what are the reasons? If still in use, what is the result of further experience; favorable or unfavorable?

We have received in all forty-three replies. In thirty-seven the first question is answered affirmatively; five have discontinued the use of their cars either entirely or in their practice, and one has forsaken the motor car for the motor bicycle.

By no means all of the thirty-seven mentioned are using the same cars as in 1903, for many state that they have bought and sold and changed about, yet all the time have used some car, and are, it would seem, of the opinion that they will continue to do so. Some have had two or three machines since owning the one with which their experiences related in the Doctor's Number were connected; but for the most part but a single change has been made.

So far as can be told accurately from the replies, there are five among the total number who are using in their work today the same cars that they used two years ago. It is likely that there are more, but if so they have not indicated the fact. A Colorado doctor writes that he has two cars at the present time, one of which has traveled 30,000 miles, and the other 12,000 miles; that he does not keep horses and has no use for them. Another from the State of Pennsylvania, states that he has covered 23,000 miles since April, 1902, and expects to use a car as long as he continues to practice. A third, from Ohio, has used his present car for three years, with favorable results. Others show by the mileage covered that they have had their cars in use very constantly for at least a good part of the time.

As has been said, five of the forty-three have abandoned the automobile. It is interesting to note that three of these reside west of the Rocky Mountains, and the other two in small towns in Illinois. This fact may have some influence in the matter, especially in the case of the first three. In regard to the other two it can be said that both have had experience with steam cars of the 1902 type, and have been handicapped greatly in the use of them by bad roads. One, it seems, has also had an unfortunate experience with a gasoline car. Finding the motor under-powered and the transmission weak, a change was made, and the result has not been satisfactory whatever the cause.

Of the first three, one states that his is one of the earliest types of cars, and his experiences with it have been unsatisfactory; and although he believes that the difficulties he had to overcome are things of the past, he has not courage to make another attempt. Another of these, finds the roads of Oregon unsuitable, except for three months in the year, and chiefly for this reason he has been forced to discontinue. The last of the five indicates by his reply that his opinion has been altered through causes arising from things and conditions peculiar to the particular car which he has been using, rather than from general conditions which would indicate that the automobile as such is unsuited to his work.

As is to be expected, a very large majority of those who have continued to use the motor car in their practice have obtained favorable results. Some are enthusiastic in their praises, while others view the matter more calmly, and, while questioning any saving in cost of operation over that of maintaining a single horse, state that their cars by speed and endurance save them much time and enable them to accomplish a considerably greater amount of work, and are, therefore, as many put it, "indispensable." In fact, it seems to be these qualities which appeal most strongly to all. There seems to be no question regarding the automobile's superiority over the horse as a means of getting about quickly, and that this fact, coupled with its greater radius of action, makes it the more desirable for the doctor.

The cost of operation is variously estimated, which is, of course, but natural, considering the widely differing conditions under which the cars are used and the great differences in the cars themselves. Those who make mention of the matter of expense attribute a large part of it to the maintenance of the tires. This, in fact, seems to be the chief item in the case of those cars which are looked after by the owners themselves, and there are many who do this. Those who depend entirely upon repairmen state that they find the charges from this source add up to figures of considerable size if the work is not properly superintended. The tendency of a number of these seems to be to make each individual job cover as long a period of time as is possible, and to include both those things which are necessary and unnecessary. However, the opinion seems to prevail that if they are kept within limits, the charges may be kept down to a not excessive maximum.

The effect of locality on expense of operation and maintenance is very marked. Those who reside in communities which are comparatively isolated find more or less difficulty in obtaining parts from the manufacturers, principally because of an apparent laxity on the part of the manufacturer in the conduct of their replacement department. A correspondent from the West states that he was forced to wait for something more than two weeks for a small but important part that reached him in two days after it had been shipped from the factory. He estimated that the cost of horse hire while his car was out of use, combined with the expense of removing the broken part and replacing the new, amounted to more than would have been the cost of making a new part himself. Such items as these have no place in the maintenance account of an automobile, and it behooves the manufacturers, in their own interest, to give only the best of attention to such cases and to supply replacements promptly. Supply stations are few and far between in many localities in which the automobile is used, and the owners must therefore depend upon the manufacturer almost entirely for the necessary extra parts and pieces, so that if he fails them they are greatly handicapped in the use of their cars.

It is but natural to suppose that the motor car would prove to be most costly to operate in those localities in which the roads are bad, either muddy for a good part of the time, or very hilly, and it is therefore interesting to note that from such localities come some of the most enthusiastic replies. One doctor writes that his car performs the work of two horses at the expense of one, and that he finds it practically as reliable under the unfavorable conditions as is the older means of transportation.

There seems to be a decided tendency to discontinue the use of the car during the winter months, owing to the difficulty experienced in preventing freezing; and also because of the lack of protection usually afforded to the riders, but there are some who drive their cars the year round, and these state that it can be done with satisfactory results if adequate precautions are taken. The doctor's car is undoubtedly the hardest to adapt to winter work, owing to the fact that it must ordinarily remain standing a good part of the time it is in use, but the success of certain owners has shown what can be done.

In conclusion it can be said that the general verdict after two years of continued use seems, as before, to be favorable to the motor car, and to indicate that it is peculiarly adapted to meet the requirements of the doctor.

Automobile Schools.

By Albert L. Clough.

Automobile schools are springing up in nearly all large centres of population where self propelled vehicles are extensively used, in response to a general desire upon the part of private owners, agents, repair men, chauffeurs and others connected with the movement, to acquire a working knowledge of the principles and practice of the vehicles with which they have to deal.

Automobiles of the three motive powers embody concrete examples of most of the great principles of engineering, and as a large proportion of the pupils of these schools are without technical training it is really a very serious problem how to arrange the instruction so that it will be intelligible to those not specially versed mechanically, and still not so superficial as to be useless. The utmost which it seems possible to accomplish during a season's course in one of these schools is to give the student some sort of a working idea of the main principles underlying the operation of cars propelled by the motive power which he has chosen, and to show and explain to him typical forms of the apparatus which forms essential parts of it. If a little actual practice in caring for, taking apart and driving a typical car of his chosen motive power can be given him, so much the better, but it is far more important to ground him well in the principles involved than to slight these and put him to handling a car before he has a definite idea as to "what makes it go."

Gasoline, steam and electric cars depend for their operation upon such widely differing principles, and the apparatus used in the three systems of motive power has so little in common, that separate courses of instruction must be prepared covering the three systems of propulsion, respectively. Any one of the three furnishes subject matter enough for more than one year of severer study than automobile schools ordinarily require. Of course there is a certain part of automobile knowledge which is common to gasoline, steam and electric vehicles. This includes the study of wheels and tires, brakes, steering gears, axles, springs, bearings and frames. Instruction covering this portion of the subject may be given to all the students together, no matter upon which motive power they may specialize.

The curriculum of an automobile school is naturally divided into three parts. There must be instruction by lectures, with separate courses covering each motive power. There should be shop or laboratory work upon typical apparatus, with a separate course for steam, gasoline and electric vehicles. Also there may well be lessons with typical machines in operation upon the road or within an ample closed space. Here, too, cars representative of the three power systems should be provided for their respective devotees.

Probably there is no better method in which to instruct, at one time, a large number of people than by lecture. As a rule, the students in automobile schools are not seriously enough inclined to learn and recite prescribed lessons, and dependence must generally be placed upon the lecture form. Some use may be made of a text book, as an auxiliary to the lectures, by assigning certain relevant sections to be read by the students before the same subjects are to be treated from the platform, but, unfortunately, there is no work yet published which perfectly suffices for this purpose. Syllabi of the lectures may be furnished the students or the lectures may be published complete, and will be found to prove valuable in refreshing the memory upon the topics treated.

Unless most copiously illustrated by means of the lantern, charts or the blackboard, lectures upon automobile subjects are likely to be of little value. The matter treated is so new and strange to the average student that no use of words can solely be relied upon to give clear conceptions of it. A good lantern slide will often convey more actual information in one minute than can be imparted by words in half an hour, and there are some portions of the automobile equipment the operation of which it is actually impossible to convey in words; for instance, the planetary gear.

The principles which underlie the operation of the three kinds of motors require to be explained in terms as far as possible free from the technical, and in order to do this recourse must often be had to analogies with matters of everyday experience. Sometimes these may be made very cogent and illuminating. It is of the utmost importance that the students shall know just what happens in a motor at each period of its operation, and why this is the case. Time put upon the basic principles, to make sure they are correctly understood, will be of more value than the same amount of time expended upon details. In describing specific parts of the automobile, the chief aim should be to select for description the typical rather than the special or peculiar.

As the instruction of automobile schools seeks to be of practical rather than of academic value, the lectures should be given by instructors who have "been through the mill" and learned by hard experience just what the average beginner most needs to know. It is not always easy to find combined in one individual thorough knowledge of the engineering principles involved in automobiles and a ripe experience in the practical handling of motor cars. As an instructor, a person who had followed the automobile for years in its practical development, even though he were a little weak upon thermodynamics, would probably be better than an expert on prime movers who had never held a steering wheel.

One difficulty in preparing suitable lectures for delivery in automobile schools arises from the different classes of people which are sure to be present. The average private owner will desire an easy, general treatment of the subject, in the most elementary terms; the prospective chauffeur or the dealer, who already may have a good working knowledge of the subject, expects a deeper and more technical treatment, and there may be well versed engineers present to whom some of the matter presented will be veritable "kindergarten."

However, a clear treatment of basic principles and a description of typical apparatus similar to that with which the average student will have to deal are probably the best ground for the lecturer to cover, so far as the average student is concerned.

The mention of specific makes of automobiles or the indication upon the part of the instructor that he leans toward the product of any particular factory is most carefully to be avoided, as it savors of advertising and leads to a general discounting of the statements of the lecturer.

As a rule a lecture course upon one of the propulsion systems will comprise the following general topics:

The motor and its essential accessories, with a description of their principles.

The practical forms which the motor takes in various typical cars upon which this particular motive power is employed, and a description of how it is controlled.

The method of transmitting the motive power to the wheels and regulating the speed of the car.

A discussion of the common derangements to which cars of this motive power are subject, and how to detect and remedy them, and general instructions as to how to care for and manage such cars.

A fair and impartial treatment of the advantages and disadvantages of the system under discussion.

In the shop course, concrete embodiment is given to the principles and forms of construction which have been dwelt upon in the lecture room, through the exhibition to the students of cars typical of the prevailing styles of machines with which they are most likely to meet.

In the steam course one of the popular, light runabouts and a specimen of the steam touring car may well be shown. The first will probably be equipped with an ordinary fire tube boiler, and the latter with a generator of the flash type, thus displaying the peculiarities of both systems of steam raising.

As typical gasoline vehicles may be shown a runabout or light car with a single or double opposed motor carried in the body and the planetary system of speed changing and a large touring car, with a four cylinder engine mounted in front, and sliding change speed gears and shaft drive.

An example of a car propelled by an air cooled motor may well be supplied.

In the electric vehicle course a car of the single and one of double motor equipment will cover the ground fairly well.

The repair department of a good sized

garage, or, if the class is large, the main floor of a storage station, which may be secured during the idle season, will provide a convenient place for the shop work. If the laboratory of a technical school can be secured it will afford some special facilities.

A sufficient number of vehicles should be provided, so that the number of students simultaneously engaged upon any one car may not be so great as to prevent a good view being obtained by everyone. Arrangements may be so made that the groups of students may pass successively from cars of one model to those of another, without loss of time.

The instructor should demonstrate how the various parts of the mechanism may be gotten at, how each is lubricated, how adjusted and how taken apart for cleaning and repairs. An ocular demonstration of the construction of each part and a general résumé of their relations may be given. In order to economize time spare parts identical with those upon the car may be on hand already in a dismantled condition.

A good course in tire repairs should be provided, as the average user will find plentiful opportunity to apply knowledge along this line.

In the steam course the water, gasoline and air piping should be carefully traced, for the benefit of the students, and pumps and valves fully explained, together with their possible derangements and how to remedy them. The indicating apparatus should be given full attention, and suggestions furnished as to the upkeep of engines, burners and boilers.

The ignition circuits of gasoline cars should be traced, and ignition apparatus given detailed attention. The cooling system should be followed through with full attention to the minutiæ of the subject, and the method of removing, grinding and replacing valves should be given careful explanation. The carburetor should be dissected and fully explained. In all this work, with both motive powers, special attention should be given those parts which are found from experience to be most valuable, but not so much so as to detract attention from the general principles of construction of the cars. In connection with electric vehicles full instruction should be given as to the charging and maintenance of the cells, and the care of commutators, wiring and controllers.

Individual work with the wrench and screwdriver, under the eye of the instructor, should be encouraged as of more practical value than merely seeing the work done by another.

If good laboratory facilities are at hand a brake test of a gasoline engine may perhaps be made and a test of electrical efficiency of a battery of storage cells.

The suggestions given cover but a few of the lines of work which may be carried out upon the cars. As these vehicles usually have to be borrowed from agents or manufacturers, it is of the utmost importance to make sure that their employment in the school as types of different methods of automobile design shall not be perverted into an advertisement for any particular factory. If favoritism is shown any particular make, and, indeed, if any prejudice is displayed for or against one of the motive powers, the students and the public are likely to come to regard the school as a "grafting" enterprise rather than as an educational institution.

Instruction in the actual handling of cars under power can, of course, be best furnished upon the road, but weather conditions may preclude this. In this event, it may be possible to use a large riding school, skating rink or armory for the purpose.

Students require to be instructed in the firing up of steam vehicles, and in the starting of gasoline motors. The use of brakes and steering gear is the most important matter in this connection, as far as safe driving is concerned. If a capable driver is always on the seat with the student who is in the operator's position, considerable effective instruction may be safely given in a space of moderate size in regard to the use of the throttle and reverse lever of steam machines, and the throttle, spark advance, clutch and gear changing apparatus of gasoline cars. The electrics are especially amenable to demonstration in a small space.

If automobile schools are conducted by experienced and well versed men, if plenty of apparatus and diagrams are furnished, and if the course can be maintained as purely educational and free from the commercial or advertising flavor, they are capable of immense usefulness.

Heating and Ventilating Garages.

By N. B. Pope.

The problem of properly heating and ventilating garages is one which demands the serious consideration of every automobile owner, whether he keeps his machine in an urban station or at home in a place of his own.

A certain amount of heat must be supplied during cold weather to keep the working parts of the car limber and to render less barbarous the necessary labor of washing and oiling. That ventilation is needed wherever gasoline is in use is axiomatic. Moreover, as the conditions are at variance with the factors which obtain in the more usual work of a ventilating engineer, the subject in its full breadth is mostly of considerable technical study.

Herein, however, we will merely attempt to enunciate certain principles, and to suggest a simple method or two by which the desired results may be obtained.

The conditions involved in the case of a large station comprising shops, offices, and several floors are too numerous and complicated to be taken up in detail here, but in the small stable and private motor house they are less complex and are, perhaps, of more vital interest to the average motorist.

Considering first the matter of heating, the problem is to keep the storage place at a reasonably uniform temperature throughout all weather changes, and this without danger of igniting the vapors which are so much to be dreaded, or of causing spontaneous combustion among the various kinds of timber always to be found lying about.

The temperature which is to be maintained, with which the choice of method to a large extent varies, depends chiefly on the fancy of the owner. The only absolute requirement is that the temperature shall never get low enough to freeze the water in tanks and pipes. This is essential, not simply because of the dangers attendant upon freezing the cooling water of gasoline machines or the boilers of steamers, but also on account of the unpleasantness of working about cold machinery, and the difficulty of filling grease cups and lubricators when the oil is congealed. Besides, if kept in a cold stable, the bearings of a car become so stiff as to use up considerable extra power when run again, while if they are kept reasonably warm when the car is standing they will not stiffen up while on the road, except in extreme weather. Moreover, certain types of carburetors give trouble when cold.

Its inflammable character and the fact that gasoline vapor is heavier than air make it imperative that the heater be one which contains no open fire—at least within the walls of the building. As it is necessary that gasoline be handled in the garage, the precautionary measures must consist essentially of placing the fire where the vapor can not come in contact with it. This may be done by locating the source of heat in another building or in a compartment of the same building, which is partitioned off by fireproof walls, and having its entrance from the outside only. Basement boiler and furnace rooms, as used in other buildings, are out of the question. And in this connection it may be noted that the use of basement floors in a garage is always unsafe, unless special ventilation is provided for removing the heavy gases which accumulate there. The not uncommon practice of locating shops and battery rooms in ill lighted, unventilated sub-floors is extremely dangerous both on account of the fire risk and because of the unhealthy conditions which are to be found there.

The heating of any building may be accomplished by either direct or indirect radiation. It may have its own heating system or it may be one of a system of several deriving their heat from a central plant, just as the several floors may be heated by a single furnace. As to the method of distributing the heat to the air in the various rooms this may be done

by placing the radiating surface directly in the room and heating it by circulating through it some conductor, like hot water or steam, or the radiating surface may be outside the room and the air heated by being passed over it and then to the room by pressure or induction. The latter method introduces a combined heating and ventilating system. Evidently this method is particularly applicable to automobile houses, as it eradicates not only all fire but all heated surfaces which might cause the charring of dry wood or waste, and the ignition of the gasoline vapors in an indirect way. But this method, involving as it does the installation of fans and heating stacks, is too expensive for use except in elaborate establishments. It is a comparatively simple matter, in many cases, to use steam or hot water heat, piping the supply from a neighboring building. This

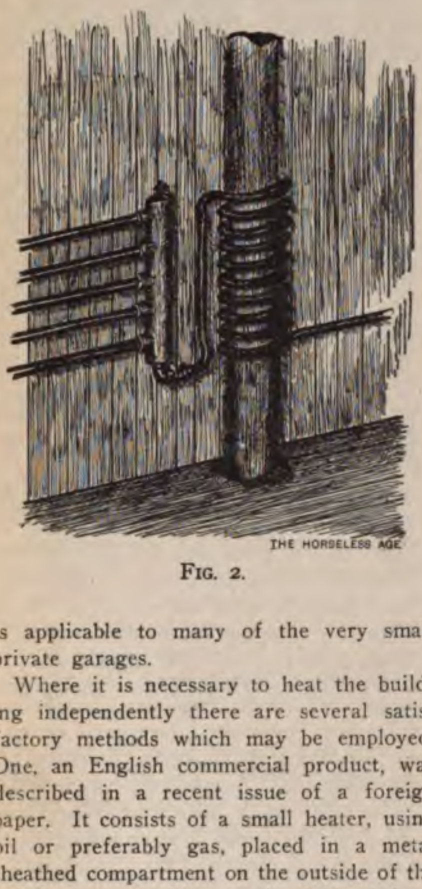


FIG. 2.

is applicable to many of the very small private garages.

Where it is necessary to heat the building independently there are several satisfactory methods which may be employed. One, an English commercial product, was described in a recent issue of a foreign paper. It consists of a small heater, using oil or preferably gas, placed in a metal sheathed compartment on the outside of the building, to which access is obtained from the outside. Within, on the adjacent wall, there is placed a combined radiator and expansion tank of simple construction. On the same principle any small heater, as is used for greenhouses for instance, may be employed, the coils being laid upon the more exposed walls and under the windows.

A simplification of this is to build the compartment sufficiently large to enclose a stove, and to place a sheet iron bell over it leading to a register in the wall, as in Fig. 1. The inside of this "lean-to" must be lined with sheet metal, and a considerable air space allowed between the lining and the sheathing to prevent undue leakage of heat. The efficiency of such a method would depend largely on the construction of the building and the amount of leakage of heated air through roof and walls, which could easily be reduced to a practical minimum, and the system thereby made very effective.

Turning to the subject of ventilation, it will be seen that the capacity of the ventilators must be sufficient to remove any excess of vapor which may be caused by unlooked for conditions in the machine, or may be due to evaporation while filling or using the gasoline for cleaning purposes.

Heated air rises. This fact must be the basis of all considerations of the ventilating problem, and in many systems it is used to induce a circulation of air from all parts of the room to one at the top. But, as already stated, gasoline vapor is heavier than air, and must always tend to stay near the floor, except when stirred by a draught. Therefore the air outlet in a garage must be at the bottom of the room instead of at the top.

Many stations, especially the small ones, are so flimsily built and have so much free ventilation unavoidably that no special provision is considered necessary. But as a safeguard against emergencies, particularly at night, when a flooding carburetor or a leaky pipe joint may be the means of distributing several quarts of gasoline over the floor, absolutely certain ventilation must be secured.

The complete indirect method of heating and ventilating may be applied to large or expensive stations with the best of success. But for the small structure a very simple method, which should be effective in clearing the danger zone within a few inches of the floor, is illustrated in Fig. 2.

An ordinary stovepipe is run up one of the walls of the building and, projecting through the roof, is topped with a ventilator cap. At the bottom it is left open a few inches above the level of the floor. Part way up the wall it is heated by close contact with the radiator. Or it may be jacketed and heated by the burning gases from the stove; but this is not to be recommended on account of the danger from sparks in the smoke passage. The air within it, thus heated considerably above the mean temperature of the room, will rise, and form an appre-

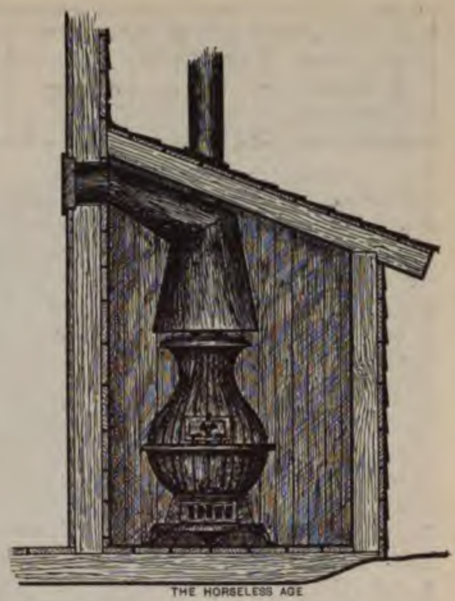


FIG. 1.

ciable draught, thus drawing from the floor by displacement. It will be seen that the effectiveness of this depends on the amount of heat which can be concentrated about the pipe at one point. The other radiating surface must be so disposed as to aid a circulation of air about the room, and produce a swirling current toward the outlet.

The diagrams, Fig. 3, illustrate the principles of ventilation. Were the outlet to be made simply a register in the outer wall of the building, instead of serving as a ventilator, it would act as a cold air inlet, the heated air within drawing in more and more by displacement, and as a result there would be no real ventilation. If the natural tendency of the air be used, and the outlet be at the top of the room, as in many of the older systems in present use, a current of heated air will be set up in an upwardly curving line from the radiator to the outlet; the heat will largely go to waste, and eddies of stagnant air will accumulate along the floor. This is what must be particularly avoided in garage work, as it is the floor line which must be cleared first. By reversing the natural tendency, wholly or in part, and placing the source of heat upon the walls, or at the top of the room, and drawing away the spent air and gas from the bottom, uniform heat distribution is secured and the necessary drainage effected.

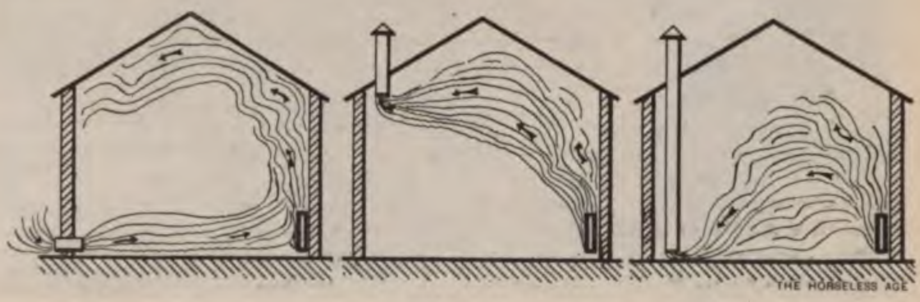


FIG. 3.

TOURING ROUTES

Touring in Florida.

By W. M. Holdsworth.

The writer was among those who had the pleasure of spending a portion of last winter automobiling in Florida, and believes his experiences may be of some benefit to others who may visit that section this winter for the first time.

We shipped our car by the Clyde Line, from New York, about ten days before we started, so that it would arrive at Daytona as soon as we did. We shipped it in care of a garage there, and on our arrival found it ready to use. We took two extra shoes and several inner tubes and a number of extra parts which we thought might be necessary. We removed the lamps and horn and packed them in a box which was shipped with the car.

As Daytona and Ormond and the famous ocean beach have been fully described so many times it will not be necessary for me to say much about them. It is an ideal locality for the automobile, and is fully up to all that has been said of it.

While we were there we wanted to know just how far the beach could be used, so we started one day from Mosquito Inlet, 12 miles south of Daytona, and traveled directly north 32 miles, and found the beach in perfect condition all the way. This was as far as we cared to go for we had to get back to Daytona before the tide was high. In addition to the beach there is fully 40 miles of good clay road between Ormond, Daytona, Port Orange, and the surrounding country. Daytona is situated upon the west bank of the Halifax River, and extends for nearly 2 miles along the shore. The beach is about 1 mile east of the town, and is approached by three good bridges over the river. The peninsula lying between the river and the ocean is only one-half mile wide. There are many fine cottages and several fair hotels located on it, and the roads there are also very good.

After spending a delightful three weeks at Daytona, and being informed that there was fully 100 miles of fine clay roads in Orange County, and as good roads were what we were looking for, we decided to make the trip. The problem was how were we to get there.

Automobile touring in Florida at the present time is not practical, for, while the roads in the cities and towns are very good, fully equal to ours in the North, the roads connecting the different sections of the State are almost impassable for automobiles. In the first place they are generally nothing but ruts in the sand, from 3 to 8 inches deep, and the wheel tread throughout the South is 5 feet, while ours in the North is 4 feet 6 and 4 feet 8 inches; and last, but not least, all, or nearly all, the land is low and marshy, and you often find what they term sluiceways, where the water is from 1 to 3 feet deep. The native drives through these places and he thinks nothing of it, but it would be a difficult task to get an automobile through them.

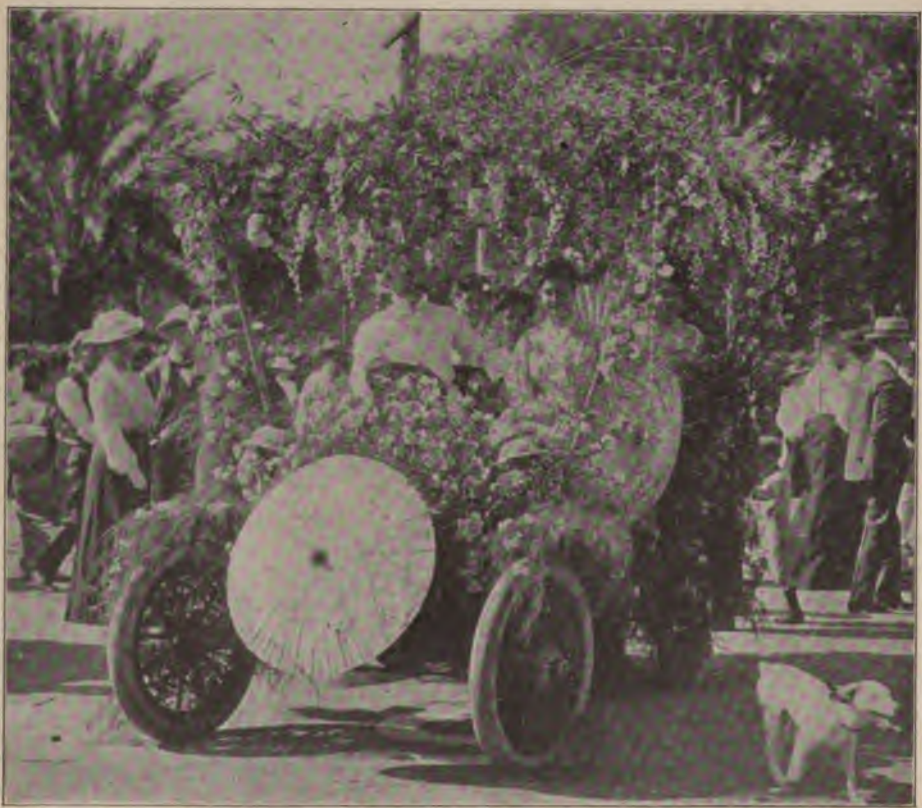
The best plan for the tourist who wishes to go to Florida, and to visit the different sections of the State, is to ship his car either by railroad or by steamer to the points he desires to reach, but this is quite expensive, as the freight rate is three times first class rate.

A road such as we have described connects Daytona and De Land. It is very poor and a number of tourists who have gone over it have had a great deal of trouble and several have had to send for horses to help them out of their difficulty. We decided it would be better to ship our car from Daytona to Orange City, and from there we went down to Palm Beach for two days. On our arrival at Orange City we found that our car had not been unloaded and were informed by the local agent that we would have to unload it ourselves. We finally secured help and in a short time we were on our way to Enterprise, 6 miles to the south, where, we had been informed, we could be ferried across the St. John's River to Sanford, and there find a fine clay road to Orlando.

On our arrival in Enterprise we learned that the ferry had been abandoned, and the best thing for us to do was to return to Orange City, then go to De Land and to Crows Bluff, on the St. John's River, from where we could ship our car by the Clyde Line river boat to Sanford. On our arrival at De Land we called on the agent of the Clyde Line, who informed us that the steamboat would arrive at Crows Bluff about 5 a. m. the following day. He also informed us that the road from De Land to the river opposite Crows Bluff was very poor, and as there was no hotel at Crows Bluff he advised us to make a trip over the road that afternoon and make our arrangements for shipping the machine. We could then return and stop over night at De Land, and get an early start the following morning.

It is only 6 miles from De Land to the St. John's River. The first 2½ miles is over a very good clay and straw road, but the balance of the way is a narrow sand road, and it was all that we could do to move on the low gear. When we arrived at a small bridge about a mile from the river we decided to stop for a few minutes and let the engine cool. After a short stop we started the engine, and, wishing to get a good headway while we were on the bridge, threw in the clutch quickly and broke our driving chain. As I was a novice in making repairs of this kind it required quite a little time to fix it, during which three teams came up behind us and had to wait, because the bridge was not wide enough for them to pass.

We finally arrived at the east bank of the river without any further trouble, and as it was quite late in the afternoon and because of our experience on the road we



Hawaiian Automobile Carnival—Winner of First Prize.

had just traveled over, we decided to take the car across the river at once and leave it there ready for shipment the following morning. One of the teams which we had held up while making the repairs mentioned was at the river side, and as it was about to return to De Land the driver very kindly offered to take us back with him. I knew it would take considerable time to get our car across the river, and not wishing to take any advantage of our new made friend, my wife returned with him and he agreed to come back after me about two hours later. I then took the car across the river on a very ancient looking flat bottom ferryboat managed by a very small boy. The driver came back for me promptly, and I arrived at the hotel just in time for dinner.

Orlando is a very prosperous town of about 3,000 inhabitants; it has several fairly good hotels, but no garage. The water is very good. A number of Northern people spend the winters there. During March the days are sometimes very hot, but the nights are always cool. The climate is dry and favorable to people that have lung trouble; but it is not a resort for consumptives in any sense of the word.

The careful automobile driver is welcomed throughout the entire State of Florida. The people there realize that the more automobiles that come there the more money will come with them, and part of it will be left. This is what they want, and they therefore take a common sense view of the automobile.

During the present winter we contemplate going to Florida again, but think of changing our trip as follows: We shall ship our car by the Clyde Line to Jacksonville, and stay there for a few days, using the machine there, for the roads are very good, then ship it by boat to Sanford. We will spend about two weeks in and around Orlando, then return to Sanford, and take our car across the St. John's River to Enterprise. From there we will go by road to De Land, then make the attempt to go to Daytona by the poor road mentioned before. If we do not succeed we will send the car by rail. We shall remain at Daytona until about March 25, and then start to tour back to New York, as follows: By road to De Land, by road to Beresford Landing, on the St. John's River; to Jacksonville by boat, to Savannah, Ga., by steamer, spending a few days in the latter place. We shall go by road to Augusta, thence to Atlanta, Chattanooga, Nashville, Louisville and Cincinnati; then to Columbus, Ohio, and thence directly east by way of Pittsburg and Philadelphia to New York.

I have corresponded with the different automobile clubs in the cities mentioned in Georgia, Tennessee, Kentucky and Ohio, and they inform me that they think that, while the roads in some sections may not be very good, the trip as a whole is practical.

Hawaiian Automobile Carnival—Winner of Second Prize.

Hawaiian Automobile Carnival.

By E. M. Boyd.

Automobiling in Hawaii is an enjoyment of recent development. For four years prior to this past summer all that was known there of automobiles was that the steam machine produced some good results, that storage battery electric machines were fairly useful, and that the promise for a vast deal of enjoyment out of the sport was good. Visitors drawn by the incomparable climate showed many of the pleasures which might be drawn from the use of speeding motors. Residents widened their own scope of travel with steam and gasoline motors, and at length the time seemed to have arrived when a display of cars would furnish a holiday diversion, and out of this belief grew the Thanksgiving fiesta, which will beyond doubt prove of interest as an annual event.

The rendezvous for the decorated cars was in the square fronting the Territorial Executive Building, one time palace of kings and queens. For effectiveness the motors were divided into series or classes. There were tonneau cars, convertible tonneaus, surreys and dos-à-dos and runabouts. In the first division were four cars, in the second six, in the third two and in the fourth seven.

The scheme of decoration showed as wide a variation as existed between the large car which led and the small one which brought up the rear of the line. The prize winning car turned up in the Olds touring car, owned by Capt. Robert Graham, master of the ship Erskine M. Phelps, who is wintering in Hawaii. His car was in Japanese effect down to the smallest detail, the cherry blossoms, wisteria, carnations and other flowers used being wired on to the complete covering of feathery bamboo. The owner drove his car dressed in white, while round him were pretty girls in taking Japanese costumes, who looked absolutely at home amid the flowers and paper color effects. More truly floral was the White car of Mr. C. W. Deering, of Chicago, the body of which was entirely concealed under masses of carnations, asters and chrysanthemums, there being carried in front, suspended on trembling wires, a splendid peacock driven with white ribbons by doves perched on top of the lanterns.

The judges, Governor Carter, former Governor Cleghorn and H. D. Couzens, included in their rewards honorable mention of the two additional White steamers, one being decorated with daisies and chrysanthemums and the other with the feathery blooms and bright green blades of the sugar cane, the principal produce of the country. Roses, carnations, the purple blooms of the bougainvillia, the bright greens of palm, fern and ti, the multihued leaves of the croton, the bright yellow flowers of the acacia toros, with streamers of ribbons, and here and there a tiny flag, combined to make the whole a picture of tropical luxuriance of color and wealth of bloom.

LESSONS of THE ROAD

Cost.

By Robin Damon.

In a recent issue of The Horseless Age an automobile owner figured up the cost of running his machine at something like 30 cents a month; or it might have been $3. Anyhow, it was a very small amount. I should like to get a pointer from such a man, because in nearly five years of experience I have found that the automobiles have no regard for cost, provided they are kept in good order for use all the time.

A few days ago I collected all the bills I had paid this year on account of automobiles—and of course I have spent considerable of which I have no record—and the totals are set forth in the tables given herewith. I have not made any account of storage, care, interest or depreciation, because the totals are large enough without those items, and so far as care and storage are concerned, I should be at the same cost if I did not have the machines. I regard the investment as sunk, so I have omitted depreciation and interest. The figures follow:

Electric runabout:	
Repairs	$307.00
New parts	66.00
Tires	72.47
	$445.47
Electric depot carriage:	
Repairs	$24.00
Tires	23.00
	$47.00
Gasoline car:	
Repairs	$621.45
New parts	128.25
Tires	236.55
	$986.25
Operating cost:	
Electric power	$135.00
Gasoline	93 00
Oil	21.00
	$249.00
Recapitulation:	
Electric runabout	$445.47
Electric depot	47.00
Gasoline car	986.25
Operating cost	249.00
Total	$1,727.72

The repair bill on the electric runabout was excessive because it met with two accidents. In one a boy started it backward, and it tipped completely over, so that the battery had to be rebuilt. In the second accident the power was turned on by a youth, and the machine ran into the side of the stable, smashing a spring, and the current burned out the field of the motor. The two accidents cost $150, the battery expense being $125. The battery would have had to be rebuilt in a few months anyhow, so that part of the cost was not materially increased. Two new tires were bought within a month, so the vehicle is well supplied, as there are several extra covers and tubes.

The depot carriage was new in May, and the only expense was for repairs to the steering gear. The tires on this carriage should run another season, as I have one new extra, supplied by the makers.

One trip of the gasoline car cost $265, because the oil was stopped up, and the result was a general smashup of the engine. At that time the car was given a general overhauling, every worn part being replaced, so that so far as the wearing quality was concerned the machine was practically as good as new. This was in January of the present year, 1904. Yet it will be seen that it cost over $350 for machinist work during the year. The new parts on the gasoline rig included an odometer, a speedometer and a searchlight, all costing $100. Therefore the list of worn parts is small, consisting of bearing cones and a piston. The tire bill was larger than it should be because a "protector" was used that spoiled two new tires in a few days. The last tires were bought this month, being two for the rear wheels, and I now have two good ones on front, and one extra shoe, with six extra tubes. The machine should run next season without new tires, but new tubes will probably be needed.

In extenuation of the seemingly extravagant cost of the three machines I can put in the fact that now all of them are in good condition, while last year all were in poor shape at the end of the winter, and the expense of repairs came in this year.

I have not kept a record of the miles traveled by the carriages, but I estimate that the electric machines went much further than the gasoline, because both were out every day. The gasoline car did not meet with any serious accident during the season, so the repairs were merely "minor" ones. They consisted of adjustments of valves, brakes, steering gear, etc. Yet the cost would have been much higher—perhaps $250—if a great deal of work had not been done in the stable by the man in charge, and also by myself. For instance, last month the whole machine was taken apart, and every bearing and gear examined. This would have been a costly job if done in a machine shop. Then tire repairs, such as patching tubes, are made in the stable. On the electric machines the commutators must occasionally be turned down, and in such cases the armature is taken to a machine shop, where the work takes but a short time. Wherever possible the cost of a machinist is saved, but in spite of economy there have been many things needed that could only be done by a mechanic in a shop where he had tools to work with. It should also be taken into consideration that I have had all my carriages long enough to thoroughly understand them, so that their symptoms are known, and in that way many adjustments and repairs are made that would be given to a machinist by many people. Had all the work performed on the three machines been done in a shop I think the cost would have been over $2,000 for the year.

I do not think my case is isolated so far as cost is concerned, for a number of friends who have good sized cars tell me that the expense has been pretty heavy. So far as I can see, there is no way to avoid the tire cost, and the repair items depend upon the amount of work performed by machinists. That is, like the tires, an unknown problem, in which experience cannot be used at all as a basis of prophecy. Even new machines must be attended to if they get out of order, and from what I can see the newer models make visits to the machinists about the same as the older styles.

During my tour of the repair shops I have seen a good many carriages under the hands of the machinists which were run by mechanics who have usually said they could take care of their engines, yet when some work was needed it meant a drive to the shop, with a bill for the boss to pay. I should think that a competent man might make nearly all of the repairs needed in his stable. When lathe work or forging was needed that part could be taken to a shop. Then the cost would be trifling, compared to the amount charged when an automobile is in a machine shop. It always seemed to me that the master machinist charged up every man working for him against an automobile as long as the car was under his roof.

I am aware that some owners of automobiles get through a season with little cost, but they do not run many miles, and use great care in handling their carriages. I know one man who owns a light steamer, and he hasn't spent $5 for the year for machinists, but he has put in all his spare time working on the carriage to keep it going. He runs slowly and goes on short trips. If he worked the machine hard he would undoubtedly be obliged to buy new parts at least, which he could put in himself, if they fitted, and that is an important point. Although automobiles are supposed to be made to standards, I have never had a new part that would go in place without being worked over more or less.

The 1905 catalogues promise perfection in design and workmanship, but somehow I do not take any great stock in the glowing statements, for, if memory serves me correctly, I read similar paragraphs away back in 1900. It has been the same each year. This feature of the automobile business makes me think that the literary fellows who compile the reading matter for automobile builders have not been on the road

the car was behaving badly. It ap- as though they gained their experi- in the seclusion of the factory walls. rer, I am now not unreasonable 1 to expect to buy a machine that un without trouble or cost for any of time, and probably very few pur- s have such ideas.

n now well convinced that automo- ıre necessarily expensive, no matter hey are used—that is, expensive for tance covered. Some folks figure out hey do not cost as much as horses ual service, but I guess they have id real experience, for I keep three , and their maintenance is nothing red to that of three horseless ma- As I have said before, in rare cases possible that some small automobile e run a season with little cost, but experiences are not safe to gamb'e The owner of an automobile must up is mind to spend money when it essary, or the machine will not be in ion to run. Economy is simply out question. When a tire bursts a new ust be bought, and there are no bar- ales for them. If some part breaks, t be repaired, and that will cost some The experienced owner understands ut this feature, and the new man will get accustomed to the demands for rom all directions.

he face of the cost, I shall keep on automobiles, and maybe I shall be find one that will run with no trou- d without expense. When I think one of that kind, I shall get some- wake me up, because it will be just m. ROBIN DAMON.

·ding Cost and Other Things.

BY H. M.

present car I bought second handed pril, it being a 1903 model runabout, ngle cylinder, air cooled engine of 5 power. I have kept careful account expenses. My mileage I estimate my gasoline consumption. I find I sily average 20 miles to the gallon; I think 25 miles would be nearer. used this summer 83 gallons, which be 1,660 miles. Here is the cost of g:

nce on machine............	$9.50
: and numbers............	3.50
....	13.15
'ements and experiments....	16.57
and repairs on same........	44.38
.l repair and running ex- nse	73.49
Total	$160.59

ust be remembered that I have said g about depreciation or care. I have to take care of the car or horse, ver I use.

ie a horse in winter because of the snow and mud, and because it is much warmer and more comfortable riding in cold, bad weather. I find the motor much faster to get around in, and more pleasant, but it is more work to keep it on the road than is necessary to get the same service from a horse.

SOME OF MY TROUBLES.

The tires are the most troublesome part, and were going to prove very expensive until I bought a small vulcanizing outfit, with which I made all my own repairs. For inner tubes the only way to put on a patch is to vulcanize it. In a shoe I have repaired a blow-out over 3 inches long by sewing with heavy thread, using vulcanizing cement to secure two or three layers of friction duck to the inside, and cement and crude rubber on the outside. In some cases I have had to set the vulcanizer three times to completely cover a patch, but they hold. I use Hartford cement and crude rubber, and am positive I have saved many times their cost in one summer.

The engine has given some trouble, principally with the intake valve, which breaks about every 500 miles, because of poor design. I lost power once when everything seemed to be all right, but found my intake spring rather weak. By tightening it and putting new joints in circuit breaker everything was made right again.

I had trouble once that bothered quite a little. The engine would develop its power as long as it was cold, but when it got hot it would "chip-chip" (not knock, but sounded something like a chicken), and would apparently heat very fast. Oil had no effect on it. The crank case, when opened, would emit smoke. For a time I was at a loss to know what to do, but ran the car for over a month until I laid it up for the winter. I then took the piston out, and after scraping the carbon deposit off, found a fine crack running across the top. It was so fine that when the part was cold gasoline would go through very slowly, so slowly as to evaporate and not drip, but when hot you could drive the whole car through it I believe. At least I lost so much power that the motor would hardly drive the machine on the high gear with two passengers in on the level.

I might add a word in regard to the care of the hands. I see several have been recommending oil, soaps, etc., but I use oil and clean waste to take off the thickest of the grease, then soap the hands well and put on a teaspoonful of granulated sugar. This will make a fine lather that will start almost anything and will not hurt your hands. If your grocer mixes much "sand" with his sugar, that will scratch off the rest of the dirt and grease, so they will be clean. The method I believe worthy of a trial. It is as effective as the various preparations on the market, and you know what you are using. Any kind of sugar will do, but the granulated has some cutting ability to start with.

MAINTENANCE AND REPAIRS

A Repaired Differential.

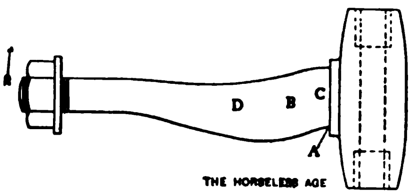
BY C. L. LAMPKIN.

Some experiences which I have had with a most vital part of an auto, viz., the compensating gears, and the way in which I made repairs, may be of interest to other motorists. The particular type of differential which I will mention is that with the bevel gears and small bevel pinions in a cast iron shell, such as are used on a number of runabouts and light touring cars.

Two runabouts of the same make had been on a long tour, and when about 100 miles from Los Angeles, in a very mountainous part of the country, the operator in the leading car, in attempting to climb a steep grade, stripped the teeth all out of his low speed gear and they ground up in the case, ruined the triple gears and broke a piece out of the transmission case. Finding it impossible to go farther, the operator of the other car proposed to run in to Los Angeles and get gears to replace the broken ones. We loaded into his car and drove all night, getting into Los Angeles early in the morning. We replaced the low speed gear, which was cast iron, with one of steel, put in new triple gears and a new shell, and the gear group was complete.

This breakdown was caused by using improper material. There is no place on an automobile where it is safe to use cast iron gears. The makers of the car in question now furnish all steel gears in their transmissions. While putting new fibre on the reverse band (the other was worn out and burned from using it as a brake), and looking over other parts, I discovered that one of the studs in the compensating gear was gone. I called the owner's attention to it, but he did not think it very serious. I proved to him, however, that it should be repaired, so he consented, and upon taking the group apart found that the threads on the plate which takes the thrust of the bevel gears had stripped, thereby allowing the gears to spread apart so far that they slipped over each other when considerable strain was put upon them. (See Fig. 1.)

We made a new stud of cold rolled shafting for the pinion to run on, filed the burrs caused by slipping off the teeth, made a new threaded plate of cast iron, bushed with bronze. This we screwed in the case the proper distance to make the gears mesh correctly; a disk of one-quarter inch boiler plate was then made with a hole large enough to go over the hub on the plate beforementioned, and fastened it securely by tapping three seven-sixteenth inch holes in the shell and screwing on seven-sixteenth inch cap screws which passed through it and into the shell. Through the disk we ran two small cap screws, which screwed into



THE BENT STEERING KNUCKLE.

the cast iron plate to prevent it from tightening against the bevel gear when the differential was in motion. To prevent these cap screws from turning, a hole was drilled through the heads and a wire strung through all of them, as shown in sketch.

I have repaired nearly forty of these gears in this way, and not one of them has gone wrong since, and while it is not a very beautiful job, it seems very effective.

Why anyone will persist in using bevel gears for compensating is beyond me. With a "flimsy" gear like this one, and a brake that isn't as good as a disappointment, there would seem to be very little between a man and eternity when driving on some of our steep mountain roads. As the old author used to say, "did you ever pause to think, dear reader," what it would mean if you were going up or down a mountain grade such as we have in California and the compensating gears should spread? If you have no hub brakes, you are powerless, for the reverse, clutches and hand brake are useless. All you can do is trust in Providence and steer for the bank.

STRAIGHTENING A STEERING KNUCKLE

Straightening a steering knuckle ought to be easy, but a great many repairmen make a bad job of it. When a knuckle is bent as shown in Fig. 2, I first take out the bronze bushings, as heating them will cause them to loosen, then remove the cone by driving a thin steel wedge behind it. I then heat the knuckle at the point A to a nice red, and dip the barrel or hub part in water to cool it, place the hub firmly in a vise with copper jaws on so the jaws will grip on the parallel faces of the hub. I then slip a piece of pipe over the axle part, leaving the nut on to prevent bruising the threads, pull in the direction of arrow until the axle is straight from B to C. Next I heat at D and cool the hub as before, and then pull in the opposite direction until the axle looks nearly straight to the eye. It is then placed on lathe centres and tested. If not true, heat is applied to the bend and a crowbar used to straighten, testing with chalk from time to time until true. A knuckle can be straightened in this way to run perfectly true without making any hammer marks.

I straighten tubular axles in much the same way without kinking them. To straighten an axle which is bent at A (Fig. 3), heat it at that point to a bright cherry red, grip it in a vise at B and pull on the long end. Always have it hottest on the side that has to stretch. To test it for a twist, place two pieces of round straight cold rolled shafting through the yokes and sight across them. Then use the same pieces, or two straight edges, on the spring seats or perches, and sight again. If they are not parallel, heat the axle and twist until they are.

To test whether the spring perch and yoke are at right angles, place a square on the spring perch and the round rod in the yoke, and sight across them. To see if the yoke eyes are parallel, measure from C to D and E to F. If desired to "set" the axles, or, in other words, to make the wheels nearer together at the bottom than at the top, bend the axle and then place a straightedge from one spring perch to the other, with a square resting on it, and measure from top of the square to the cold rolled shaft, and then from the bottom of the square to the shaft on one end of axle. Take the same measurements at the other end. The difference from the top to the bottom of the square should measure the same at each end of the axle to ensure the same angle of pitch for both wheels.

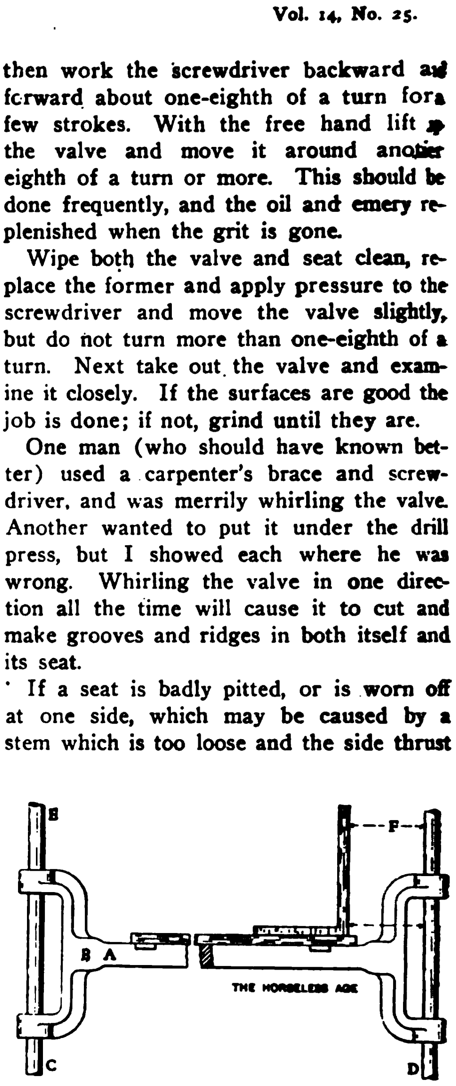
GRINDING VALVES.

A thing that plenty of good machinists do not know how to do properly is to grind a valve. If a valve and its seat only need "freshening" a little, some flour emery, a little lard oil and a screwdriver are all that is necessary, except a grand amount of brains to work the screwdriver properly. Put a little oil on the valve, and sprinkle on some emery flour. Put the valve in place, with the screwdriver in the slot, and then work the screwdriver backward and forward about one-eighth of a turn for a few strokes. With the free hand lift up the valve and move it around another eighth of a turn or more. This should be done frequently, and the oil and emery replenished when the grit is gone.

Wipe both the valve and seat clean, replace the former and apply pressure to the screwdriver and move the valve slightly, but do not turn more than one-eighth of a turn. Next take out the valve and examine it closely. If the surfaces are good the job is done; if not, grind until they are.

One man (who should have known better) used a carpenter's brace and screwdriver, and was merrily whirling the valve. Another wanted to put it under the drill press, but I showed each where he was wrong. Whirling the valve in one direction all the time will cause it to cut and make grooves and ridges in both itself and its seat.

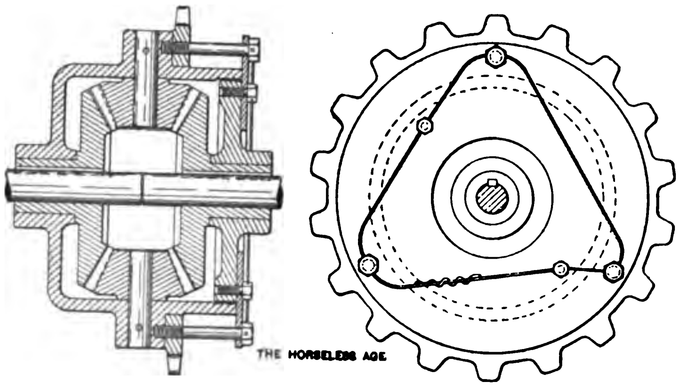
If a seat is badly pitted, or is worn off at one side, which may be caused by a stem which is too loose and the side thrust



SHOWING METHOD OF TESTING AXLE.

of cam (in some engines), and no reseating tools are in reach, true the valve in a lathe, mix some dry red lead with lard oil to a paste, and put a thin coat on valve. Place it in its seat, move slightly under pressure, then remove and scrape with a sharp steel scraper where red marks are shown. Repeat until the seat shows a fairly good general bearing, and then grind as before.

Grindstone dust is better for brass valves than emery. I had a bad case of side wear on an exhaust valve, and the machinist who was grinding it insisted that the valve and seat were all right, as he had faced the valve in the lathe and it had shown marking all around. I examined it by the red lead process. It might have held pumpkins, but I believe small potatoes would have rolled through. The seat was side worn so badly it touched only about one-half way around. Some vigorous scraping and regrinding soon produced a good compression.



SHOWING METHOD OF REPAIRING DIFFERENTIAL.

Out-of-town subscribers of The Horseless Age, who intend visiting the New York Automobile Show, are requested to communicate with the Editor, if possible mentioning the name of the hotel at which they will stop when in the city.

New Vehicles and Parts

1905 Wayne Four Cylinder Car.

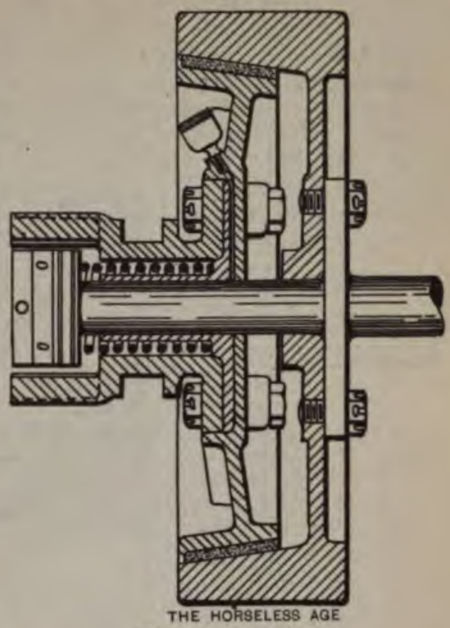
The Wayne Automobile Company, of Detroit, Mich., are placing upon the market a car propelled by a four cylinder motor which is rated at 20 horse power. The bore and stroke of the cylinders are respectively 4 and 5 inches, and they are of the individual, vertical type; all valves are mechanically operated, the inlet and exhaust being placed on opposite sides of cylinders. Removable plugs are placed above the valves. The spark plugs are screwed into those on the inlet side, and relief cocks into those on the exhaust side. The cam shafts are inclosed in the aluminum crank case. The tappets are spring seated in bearings which are held down in pairs by a yoke which is secured by a stud and castellated nut, and are therefore readily removable. The tappets have large, flat, hardened heads, which bear upon the cams. The valves are one piece forgings, interchangeable, and their stems bear direct in the cylinder castings. This permits of a very direct exhaust opening without interference.

The piston, which is 5 inches long, has three rings placed above the wrist pin, which is a half inch above the centre of the piston. This, evidently, is done to give a longer connecting rod, the length of the latter being 10 inches, or twice the stroke. The wrist pin is hollow, 7/8 inch diameter outside, and 3/8 inside. It fits tightly in the piston and is held from lateral movement by a pin. The connecting rod is a drop forging, of I beam section, carries a plain bushing for the wrist pin and a removable cap and split bushings at crank bearing. The crank shaft is a drop forging, all bearing parts being 1 3/8 inches in diameter. It is provided with one central bearing, which is 2 3/8 inches long, while the end ones are each 3½ inches. The cam shafts run in the same angular direction as the cranks, there being intermediate idler gears connecting the crank shaft pinions to the cam shaft gears.

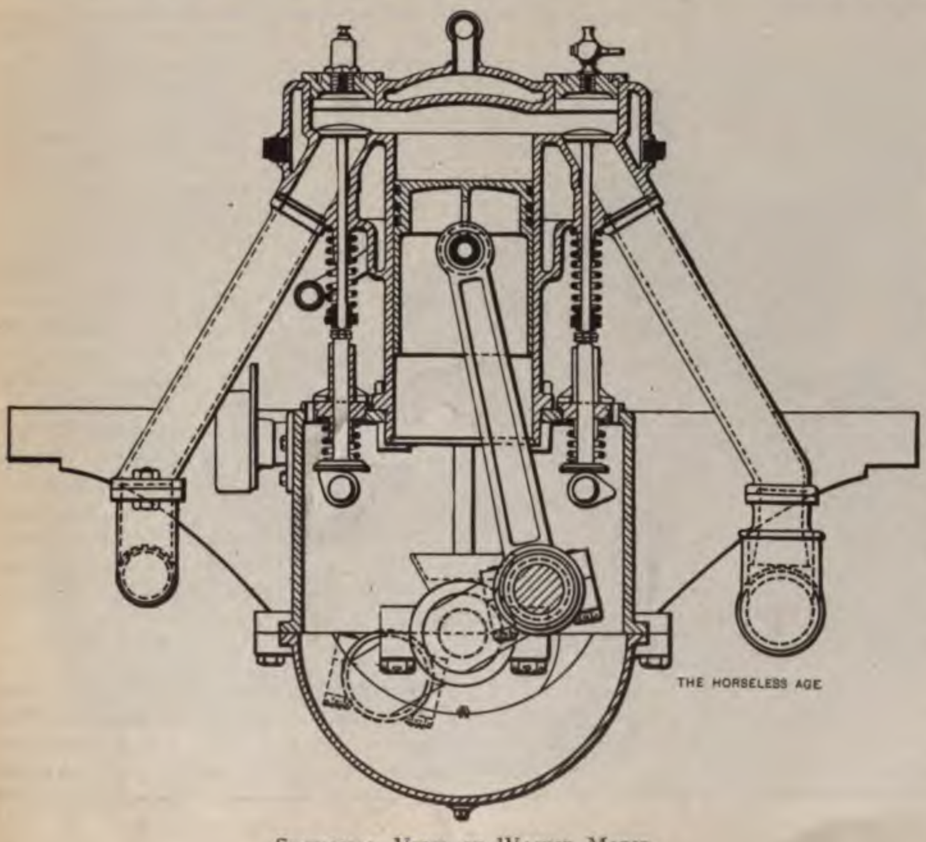
The crank case is split horizontally at the centre, the crank shaft being suspended from the upper half. The lower half has thin partitions for stiffening the case and preventing the flow of oil from end to end.

The exhaust and inlet pipings are alike, the four pipes from each set of parts converging in a common point. Here they are joined by flange couplings to a single pipe, which leads to the carburetor or muffler, as the case may be. The muffler is made from a series of sheet metal cones having a large hole at the centre and smaller ones surrounding it, the whole being inclosed in a sheet metal case. The vaporizer is provided with a float feed, and the supply of gasoline is adjusted with a change of throttle.

The ignition is by jump spark, using four coils, which are mounted on the dash; they are supplied with current from two sets of dry batteries. The commutator is driven by spiral gears, and is placed by the side of crank case. The engine is lubricated by force sight feed, having one pipe only, which supplies the crank case, the splash then being depended upon to do the rest. The sight feed is in plain view on the dished dash, but the tank for same is on the opposite side, underneath the bonnet.



Wayne Clutch.



Sectional View of Wayne Motor.

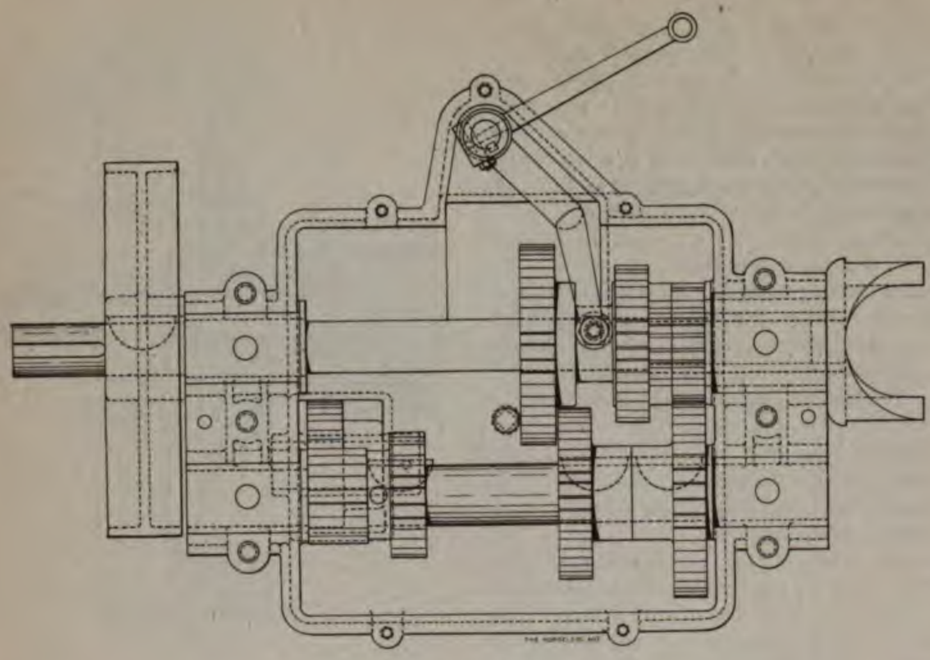
The water is circulated by an eccentric pump mounted on an extension of one of the inlet valve cam shafts. The radiator is of the diagonal square tube Mercedes type. The fan behind it has ball bearings. The governor is mounted on the other cam shaft, and is designed to keep the speed constant, regardless of load, at whatever speed the operator may desire at the time. It is controlled by a lever conveniently placed on the steering wheel.

The inner rim of the flywheel is coned to receive the moving member of the clutch, which is of typical design, with ball thrust bearing for spring. Connection with the change gear is made by means of a dog clutch, the projections of which are of such length as to allow the necessary lateral motion. The flywheel is fastened by studs to a flange forged on the crank shaft, the latter extending through and supporting the clutch members.

The change gear is of the sliding type, providing three speeds forward and a reverse, with direct drive on the high speed. The countershaft is run continuously. All bearings are plain, and are lubricated by splash.

Directly behind the case a brake drum is mounted on the forward end of the Cardan shaft. Pressure of the foot lever, through a horizontally placed toggle, causes a pair of leather faced shoes to grip this drum, while the clutch is at the same time drawn out by means of an interlocking arrangement. The shoes are supported by a bracket attached to cross member of frame.

The construction of the universal joints



WAYNE CHANGE GEAR BOX.

in the propeller shaft is something of a departure from usual practice. They are, as it were, the regular Cardans turned inside out, the cross being in the form of a ring with bearings, and the yokes entering these from inside. Each ring is made up of two smaller rings, containing four half bearings, which are coupled together by bolts. The squared shaft and socket in the propeller shaft are located near to the front joint.

The rear axle drive is a typical bevel gear construction with ball bearings. The hollow axle, however, extends through the wheel hubs, the latter being mounted thereon by means of ball bearings. The driving shaft extends through the sleeves and drives the wheels by means of clutches formed in the hub caps. A tubular radius rod is clamped between the two parts of the casing of the bevel gears and hinges to a bracket attached to a crosspiece in the frame. Brakes similar to those on the Cardan shaft act on the rear hubs, the toggle being, however, of vertical construction. They are operated by rods and bell cranks.

Steering is accomplished by a hand wheel which operates a nut and pinion combination. The frame is of pressed steel construction, 4x1$\frac{3}{8}$x$\frac{1}{8}$ inches at the largest section. There is no sub-frame, the engine and change gear cases having long arms, which extend out to the main frame, to which they are attached. The front axle is set 4 inches in front of the centre line of the spring. It is a steel forging of round section at the centre and square toward the ends, and the steering yokes are integral within it. The rear springs, which are 40x1$\frac{3}{4}$ inches, are hinged at their front ends to a rod which extends across and through the frame, while the rear ends are linked to the forged frame terminals. The front springs are 38x1$\frac{3}{4}$. Wheels are of wood and shod with 32x3$\frac{1}{2}$ inch detachables. The front wheels have ball bearings, using $\frac{5}{8}$ inch balls in the inner row and 7-16 inches in the outer. The wheel base is 100 inches and the tread standard.

The control mechanism consists of two levers, which operate over ratchet arcs on top of the steering wheel and vary the throttle and spark; two foot levers for the brake and throttle and a hand lever for the hub brakes.

The Peerless Cars for 1905.

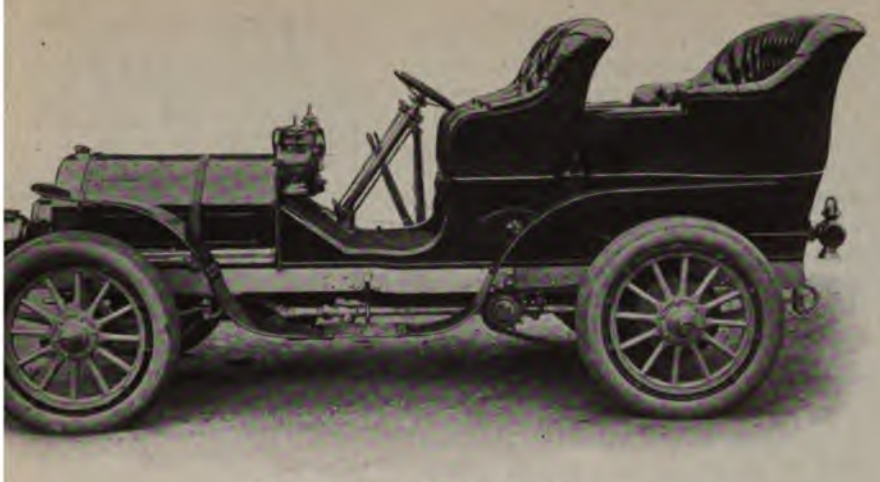
Many changes have been made in the construction of Peerless cars for 1905. The engine is of entirely new design. It is of the four cylinder vertical type, with the cylinders cast in pairs. There are no valve chambers; the valves, which are in cages similar to the ordinary induction valve, are placed directly in the top of the cylinders, and are operated, as this style usually is, by a walking beam motion. The cam shaft is located inside the crank case, and has one centre bearing in addition to the two end ones. All three of these are attached to the upper half of the crank case, and, in addition to the oil splash, are lubricated directly through tubes from the oiler. The connecting rods and cam shaft are oiled by splash.

The pistons have four eccentric rings and are lubricated by individual tubes from the sight feed. The governor, which can be adjusted from the steering wheel to regulate at any desired speed, is placed inside the cam shaft gear. An acceleration button in the footboard permits increasing the speed at any time, but as soon as the foot is lifted the motor immediately resumes the governed speed. The spark control is also attached to the steering wheel.

Ignition is effected by the jump spark system in which a high tension magneto is used, which is driven by chain from the half time shaft.

Cooling is accomplished by a corrugated tubular radiator of new design and centrifugal pump, driven by gears from the cam shaft. The former is made of a series of vertical tubes of small diameter, which

1905 PEERLESS.



THE HERSCHELL-SPILLMAN CAR.

tted with small fins and run between at the top and bottom.

clutch is of the inclosed cone type, ame as last year, except that it is connected to the change gear group square shaft sliding in a square t. The change gear is of the sliding selective type, providing four speeds rd and a reverse, with a direct drive e fourth. The bearings are all lubri- by splash, the oil being caught in ts over them.

transmission is by bevel gear and n shaft, and the Cardan joints now aluminum covers, which are filled grease. The front axle is a drop ng of I beam cross section. Both and and foot brakes operate on the hub drums. The foot brake oper- external bands, while the emergency s are of the internal expansion type. h pedals have been substituted for iano type, for both the brake and . The frame is of pressed steel, and the same width throughout, the bend dash having been abandoned. The rame is also of pressed steel and parallel with the main frame. The springs are 36x1¾ inches and the nes 48x2 inches. Fenders, steps and brackets are now all made detacha- The different sizes of bodies sup- all have side entrances and are of ed steel construction. Limousines and ulettes will also be made to order. The s fitted are 34 inches in diameter, t in the case of the 60 horse power o which 36 inch wheels are fitted.

he Herschell-Spillman Car.

Herschell-Spillman Company, of Tonawanda, N. Y., are now putting three sizes of four cylinder water d motors for automobile use, which ated at 16-18, 24-30 and 45-55 horse r respectively. The cylinders are cast ately and the crank case is made in sections. To the upper one the lers are attached and to the centre ank shaft, while the lower part serves y as a means of enclosing the parts and of holding the lubricating oil. The two upper sections are of cast iron and the lower one of aluminum. The crank shaft has five bearings.

Mechanically actuated valves are fitted and all moving parts, including valves, stems and springs, are enclosed in compartments formed either as part of the crank case or the cylinders. The driving pinions for the half time mechanism are of steel, while the driven gears are of fibre. Jump spark ignition is employed and the plugs are located directly over the admission valves. Splash lubrication is used.

The company also build complete cars to order. The one shown in the accompanying photograph is equipped with the 16-18 horse power motor, which has a bore of 4½ inches and a stroke of 5 inches.

The clutch used is of the metal on metal type and delivers the power to a three speed sliding gear change gear group, from which it is transmitted to the rear wheels by countershaft and side chains.

The main frame is of hand forged steel, shaped to give a channel section, and is mounted on 42 inch semi-elliptical springs in front and 44 inch springs at the rear. The front axle is a drop forging, having the steering yokes integral with the centre portion. The rear axle is hand forged. The wheel base is 100 inches and the tread 56½. The wheels are 34 inches in diameter and are shod with 4½ inch tires. Plain bearings are used throughout. The wheels and crank shaft revolve in phosphor bronze bushings and the other bearings are babbitted.

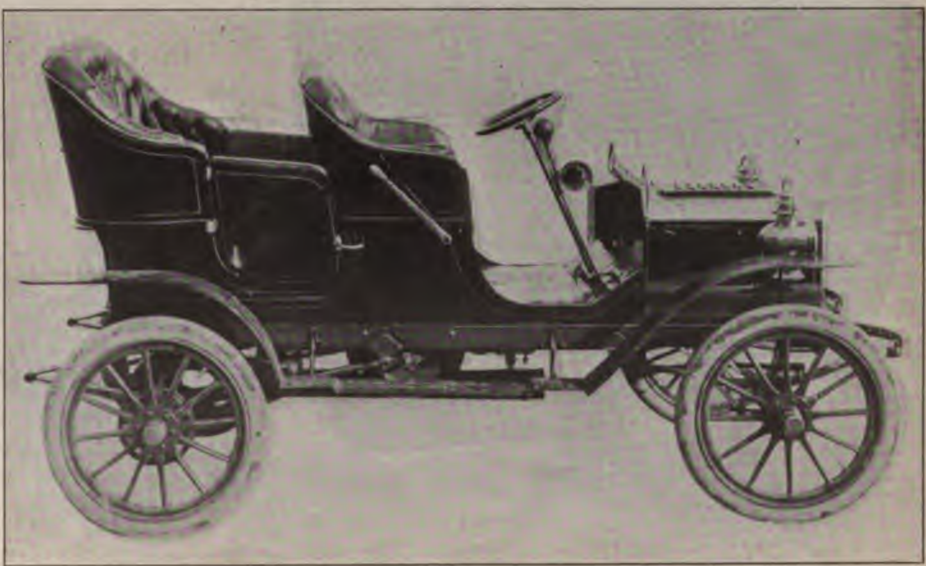
No governor is fitted to the motor, the regulation being obtained by means of a hand controlled throttle and a variation of the time of ignition.

The New Reo Car.

The accompanying photograph shows the product of the Reo Car Company, of Lansing, Mich., for the year 1905. It is propelled by a two cylinder motor of the horizontal opposed type, which is so attached to the frame that the flywheel comes at the side. The cylinder heads are cast integral with the walls, which are attached to the crank case by four bolts. The inlet valves are mechanically actuated, and a separate carburetor is provided for each cylinder, which is attached directly to the cylinder wall.

The radiator, which is fitted to the front of the bonnet, is built up of a series of flattened tubes, which connect with tanks on either side. It is claimed that if the water freezes in these they will not burst, but will give sufficiently to make up for the increased expansion.

The change gear group is of the planetary type, providing two speeds and reverse and having no intermediate gears. The drive from the engine to the rear axle is direct when the high speed is in use. Together with the engine this group is mounted on a sub-frame which is attached to the main frame by four bolts, so that both can be removed from the car together as a unit.



THE REO CAR.

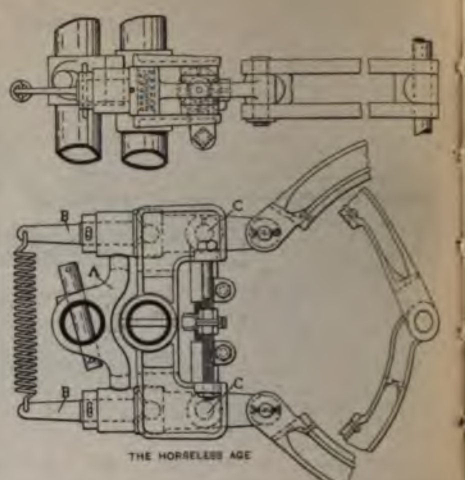
The Oldsmobile Delivery Wagon.

The Olds Motor Works are bringing out a delivery wagon which embodies features which show a departure from the past practice of this company. The engine, which is located under the operator's seat, has two individual vertical cylinders, 5x5, held by studs and flanges to a cast iron two part crank case, and is rated at 16 horse power. The valves are all mechanically operated, and are located on one side of the engine, thereby requiring but one cam shaft. At the ends of the valve stems caps are mounted to receive the spring thrust, and also that from the tappets. The latter are variable in length by means of bolts which screw into the tappet stems. Each stem has threaded upon it a cupped out flange nut and a lock nut, the cupped portion of the former containing a fibre washer which acts as a buffer to deaden the noise and shock as the tappet drops from the raised portion. It also prevents contact between the tappet and the cam shaft, except when the valve is lifting. The tappets and housings are readily removed by loosening a pair of nuts which hold a yoke that serves to secure each pair in position. The pistons are 6½ inches long, and have three eccentric rings above the wrist pin and three oil grooves near the bottom. The wrist pins, which are hollow, are set slightly above the centre and are rigidly held in position by taper plugs screwed into each end, which expand them. Further, for extra security, a hole is tapped in one of the bosses of each piston, and a set screw with lock nut screwed in. The connecting rods are drop forgings, adjustable at the top for pinching a slotted bushing. The lower end has a removable cap, which is held by two bolts. The crank shaft, which is 1⅞ inches diameter at both shaft and crank bearing, has three bearings, that at the flywheel end being 4 inches long; the front, 6 inches, and the centre one, 3⅛ inches long. Counterweights are fitted on each arm. All bearings are babbitted with nickel babbitt, and are oiled from a force feed lubricator with sight drip that is driven by a gear which meshes with the half time gear on the cam shaft. All bearings are attached to the upper half of the crank case, which is also fitted with small hand holes for inspection purposes.

On each side of each cylinder a portion of the jacket is cast open, the edges are faced off and the apertures covered by sheet metal. It is claimed that this will prevent breakage of cylinders in case the water in the jacket freezes, as the sheet metal will give and relieve the pressure.

Ignition is by jump spark, the plugs being located between the exhaust and inlet valves; they screw into brass bushings so that by changing bushing metric or standard threads may be used. The commutator is mounted on the end of the cam shaft, and is of the internal ring type, having a roller which makes contact with segments inside an internal commutator. A double coil is used.

The flywheel end of the crank shaft is arranged to receive the starting crank, while to the other end is keyed a Morse Silent chain sprocket pinion. The engine is mounted crosswise of the wagon, and the driving power is transmitted through the Morse chain to the countershaft, which carries the change gear group and differential, and from there by side chains to the rear wheels.

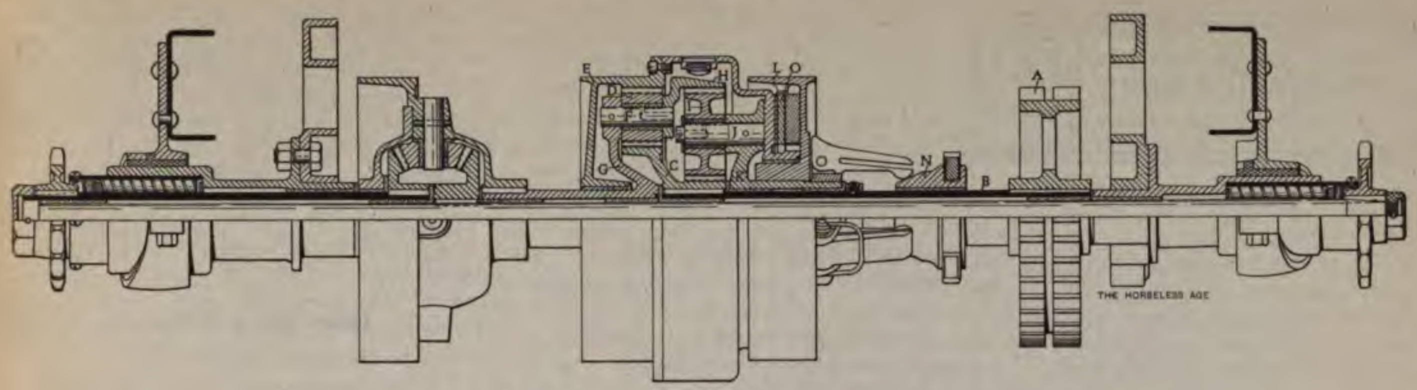


Olds Low Speed Clutch.

The sketch herewith shows the change gear, which is of the planetary type. A is the sprocket by which drive from engine is received. This drives the tubular shaft B, upon which is keyed the gear C. The latter meshes with the planetary pinions D, which in turn mesh with the internal gear on the drum E. The planetary pinions rotate on the pins F, which are supported by the spider G, and in turn support at their opposite ends the internal gear H, which meshes with planetary pinions I. These are rotatable on the pins J, which are supported on the spider K. O is a friction disk, with projecting teeth that loosely engage with the drum L which slides on a squared portion of the spider K. Between the sides of these two parts is another disk, with internal teeth engaging a corresponding set on the low speed drum or external casing, and between this drum and the first mentioned disk is mounted a hard fibre facing, which is riveted to the latter. Screwed on the end of the spider K is a plate having three clutch dogs that bear against the drum L. When the clutch band is tightened on drum to the left the gear C causes the pinions to rotate as planets in the same direction as, and around, the main shaft carrying the spider G, which is keyed to the drum of the differential, with them; gives the low speed. In the meantime the planets I are rotating idly around in the same direction. When the band on drum L is tightened the planetary pins J are held from rotating, thereby causing their pinions to rotate on their own axes and drive the spider G in the opposite direction. In this way the reverse is obtained. The high speed is obtained by shifting the cone N, which causes the casing and reverse speed drum to lock together and thus to cause all to revolve together at the same speed as the shaft.

The differential is of the bevel gear type, and drives a hollow shaft on one side and a solid shaft on the other, which, to give rigidity, extends from end to end. The

Olds Delivery Wagon.



OLDS DELIVERY WAGON COUNTERSHAFT.

whole shaft rotates in Hyatt roller bearings.

The clutch device for the low speed drum is shown in the accompanying sketch and is operated by a shifting motion of the piece A, which spreads the two levers B B, the latter mentioned being pivoted at the points C C, causing the two ends of the clutch to be drawn together, and thereby binding against the drum. The high and low speeds are operated by a hand lever at the side of the operator's seat. Pulling this backward gives the low and pushing forward the high speed. Another side lever is used for the hub brakes, and a foot lever for the brake on the differential. The hub brakes are of the internal expanding ring type.

The throttle is controlled by a rocking pedal which is automatically locked in any position. The spark is shifted by a ratchet lever beside the change speed lever.

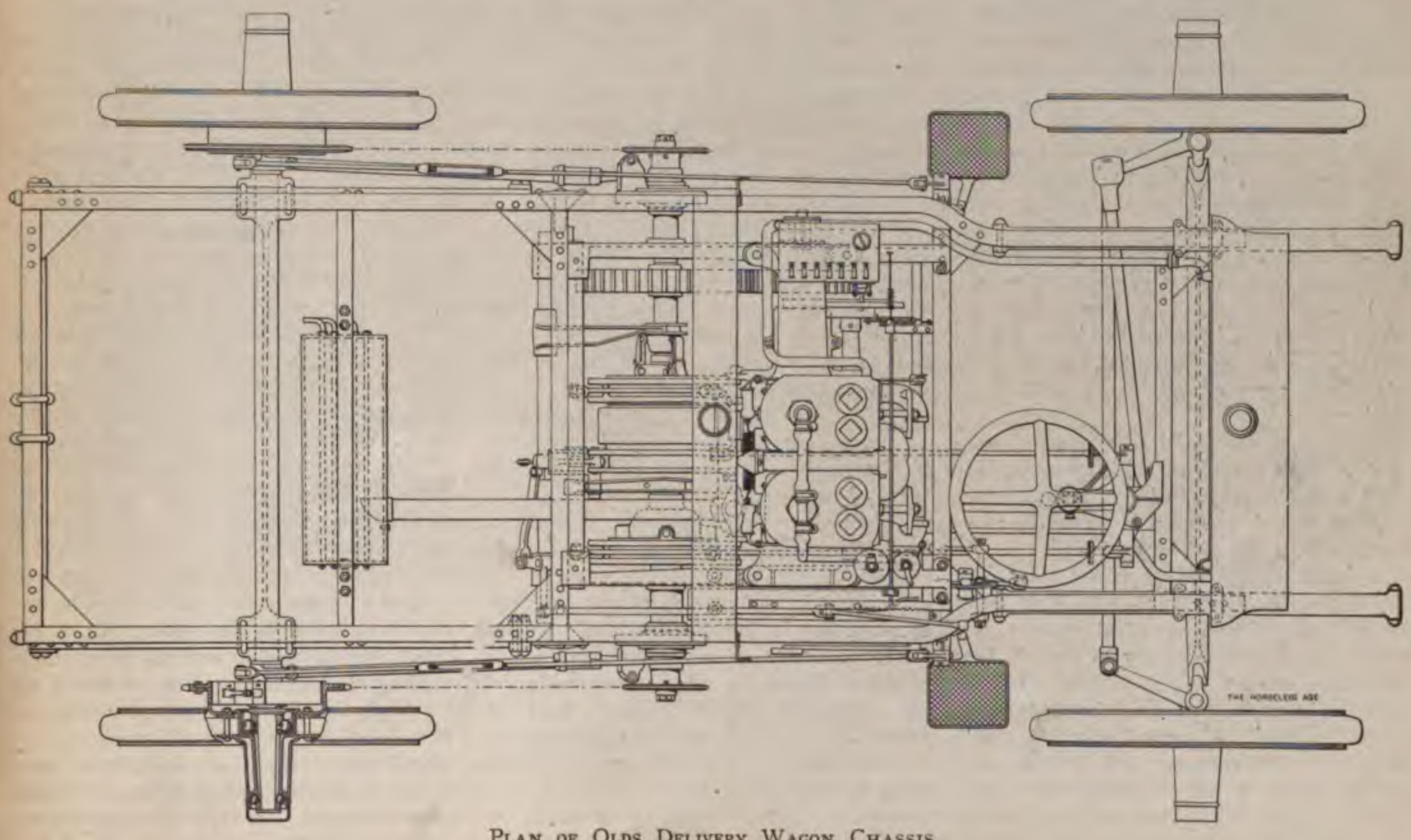
The frame is of pressed steel; the springs front and rear are of the platform type. Radius rods extend from the axle to the countershaft brackets, the adjustment of which is obtained by turning the ball section which is threaded onto the main rod.

The radiator is of the tubular flanged type, of liberal dimensions. The weight of the wagon is 3,200 pounds and its carrying capacity 2,000 pounds.

E. J. Willis' New Parts.

E. J. Willis & Co., of 8 Pork place, New York, have recently brought out several new devices for use on motor cars. One of them is an electric speedometer, which will be placed on the dashboard in the conventional way, but will be operated by an electric current supplied by two dry cells, instead of by a flexible shaft. Another is a dashboard grade meter, which is contained in a watch shaped case, and indicates the grade of the hill by the position of a hand on a clock dial easily read from the driver's seat. The Yankee Vibrating Steering Wheel is constructed with a yielding medium between the rim and the centre of the wheel, which, while perfectly rigid as far as the real needs of a steering mechanism are concerned, it has a certain amount of flexibility to absorb the vibration and shock of the road.

During 1903, automobiles and parts to the value of £2,219,912 were imported into Great Britain.



PLAN OF OLDS DELIVERY WAGON CHASSIS.

COMMUNICATIONS

The Use of Cooling Oils.

Editor HORSELESS AGE:

You ask for experience with cooling oils. I have had some. To begin I will say that the best cooling oil I have run across is kerosene. You see why I do not dare to recommend cooling oils to others.

There are several points to be considered in determining whether an oil can be used in any particular machine. The specific heat of oil is low as compared to water, therefore it will get much hotter than the water unless it is pumped faster. This extra heat may be so great as to melt the soldering of the radiator and tanks, for the average cooling oil does not come to a moderate boiling heat and stay there as water does. If controllable this greater heating may be an advantage, making for greater fuel economy, and because a hot radiator will give off more heat proportionally than a cooler one.

The packing and connections have to be thought of. Hot oil is an excellent solvent of rubber. In my machine there are no rubber connections, but I found that in a very short time the inwardly projecting edges of rubber packings were cut off as with a knife.

Then comes the question of carbonizing, perhaps the most important of all. If the oil is not entirely volatile, absolutely without residue, it will coat the cylinder walls with carbon when overheated, and that coating is apt to be very difficult to remove in cylinders cast in one piece, so if the cylinder did not burn out the first time it would finally succeed in doing so if used.

My own trials of oil for cooling were entirely successful so far as the cooling was concerned. They were made during the hot weather, at which time the burden thrown on the cooler is greatest. The oil used was Standard Gas Engine oil, to which one-fifth of kerosene had been added. The pipes were so leaky that the oil was left in only long enough to try well on a good run.

It seems to me plain that your correspondent either used too thick an oil or his pipes were clogged with ice. The glycerine solution would promptly cut out ice that would not be affected by cold oil.

A doctor in this neighborhood was very enthusiastic on the subject of oil cooling. He told of a friend who had entirely destroyed a cylinder in trying to use oil, but that was because an unsuitable oil had been used, he was sure. So the doctor got himself a supply of an oil prepared especially for the purpose, and incautiously started off on a trip without trial. His engine heated, and he was forced to drain out the oil. I cannot say what his trouble was, but most probably it was due to insufficient circulation. There are on the market a number of machines in which the hot water goes from the cylinder to the tank, and then to the radiator, and in which the water circulation is such that if the engine is run full power the cooling is helped by a slight and ordinarily harmless boiling. It is evident that it is very unsafe to use oil in any such machine, where the cooling draws on the latent heat of evaporation even in the slightest degree. For if the oil is volatile inflammable vapors will be given off, and if not entirely volatile it must encrust the cylinder. One of the virtues of kerosene is that the vapor it gives off when boiled is so bulky and unpleasant that it cannot well be ignored; its boiling point is high enough to show that the cylinder is abnormally hot.

I am convinced that a suitable oil is the best thing to date when the design of the automobile admits its use. My advice to anyone wishing to try oil is to go at it very slowly.

GEO. A. BATES.

"A Question of Responsibility."

Editor HORSELESS AGE:

On page 557 of your issue of November 30, under heading of "Question of Responsibility," in answer to an inquiry, you say: "The driver is responsible whether he owns the machine or not." I am not in the law business, and do not claim to be an expert, but I beg to differ with you on this point, as, for instance: The negro driver of a doctor's buggy in this city ran into and knocked down a man who ought to have had better sense than to have tried to cross the street in the pouring rain that was then falling.

The man was not badly injured, but sued the owner of the vehicle for damages, although he was at the time not even in the buggy. After a bitter fight, the case going to a higher court, he recovered $300.

When I started to operate my autolivery business my attorney advised me to incorporate with a very small capital, so if any one was injured by the machine, no matter how it happened or who was running the machine, they would not be able to secure large damages.

ORMOND L. BARRINGER.

[The answer which prompted this communication was evidently misleading because of its brevity. In the particular case to which it referred, namely, that of a man who is driving while on his own business a car which is the property of his wife, it is undoubtedly correct. It was not intended to convey the idea that the driver of a car is solely responsible for whatever damage he may do, regardless of the ownership of the vehicle. This, of course, is not true. He is always liable, however, and if it can be proved that he is guilty of negligence damages may be collected from him. The hired driver of an automobile, while driving the car of his employer on the latter's business, bears the relationship to him of agent to principal, and the latter is liable for any injury the former may do in the performance of his duties; but if it can be shown that at the time the damage was done the driver was not strictly engaged in performing these duties, the owner of the vehicle is not liable. The driver always is. —ED.]

Graphite Lubricants.

Editor HORSELESS AGE:

There is sometimes talk in the columns of THE HORSELESS AGE on the use of graphite as a lubricant for automobiles. I have been using it for several months. The first time I used it I tried the car on the steepest hills in our neighborhood (on York road, above Philadelphia), and to my surprise I went up two or three of them on the high gear which I had never been able to climb before.

This test convinced me that graphite was a good thing—at least for a single cylinder motor.

I use the finest flaked graphite and dust it into the cylinder with an insect powder squirt can, such as can be obtained at any drug store. Very little is placed in the forward section of the cylinder; through the spark plug hole. At the rear end of the cylinder, through the removal of the hand hole on top of the engine case, it can be used more liberally. Turn the flywheel around until the piston is at the foremost part of the cylinder (nearest the head), then dust the inner surface of the cylinder with the graphite.

In testing the graphite cup grease I found that it ran around the bearings, showing all parts well oiled. It seemed to stay better than did the ordinary cup grease, which I used in the cup on the opposite side of the main bearing during the test.

PENROSE ROBINSON.

Queries.

Editor HORSELESS AGE:

What is the material used in dry cell batteries? It seems that the batteries we get now are out of service after 100 to 200 miles use. The amperage will fall to 4 to 6 in a short time. What causes the moist or steam muffler exhaust on starting engine after a day or two? Does the use of graphite in oil used in cylinder increase the efficiency of the motor? What length of coil should be used in an 8 horse power double opposed motor cooler?

J. U. BLOSE, M. D.

[We published a description of the dry cells used in ignition circuits in our issue of June 8, 1904. The subject covers too much ground to be thoroughly covered here. Fresh, dry cells of standard make should give better than the mileage mentioned, especially with a single or double cylinder motor. There may be some short circuit in the ignition circuit. The steam

referred to is probably that which is seen when the moisture which has condensed in the various pipes is converted by the heat generated in the motor.

We print in another column a letter regarding the use of graphite in motor cylinders. Many have found that it gives good results.

The French have a rule of thumb for figuring the length of the ordinary flanged pipe necessary to cool a given engine, which is 1 metre per horse power. Grouvelle and Arquembourg give the following table of sections normal to draft per horse power:

	Sq. Inches.
1 tube deep	34
2 tubes deep	18
3 tubes deep	12.8

—Ed.]

Some Suggestions.

Editor Horseless Age:

Some auto maker will awake some time to a realization that the present flaring, obtrusive and abnormal mud guard can be replaced by a rather close fitting, semi-circular guard of inverted U cross section, mounted on the axle and perhaps supported on the outside by the hub nut. Such a guard might extend three-fourths around the tire. A clearance of one-half inch in place of the usual 5 or more inches would give a trim appearance, while the depth of the U might be made sufficient to envelop both tire and rim. Perhaps a tempered steel woven wire fabric of close mesh may be found adequate to stop mud and water effectually, and yet yield to blows without resulting damage. A stream of water from a hose would quickly clean such a guard.

I believe the "side entrance" car should have the doors hung with loose-pin butts so they can be unshipped if desired. This takes off 20 pounds, makes the car cooler in hot weather and gives it the "surrey" appearance.

Why is it not practicable to use Hartshorn or other shade rollers around the margin of a canopy top to take up the side curtains and stow them away neatly without the regular vexations and endless bother now necessary? A hanging rim or valance would hide and exclude rain and dust.

I believe that since no skill in engine making can provide power sufficient to overcome a 30 per cent. grade, all cars of the heavier class should have a winding drum capable of being connected with the motor at will, the power being, meanwhile, disconnected with the driving mechanism, so that a rope, fixed at some point forward, could be wound upon the drum, and thereby carry the car over an otherwise insurmountable obstacle.

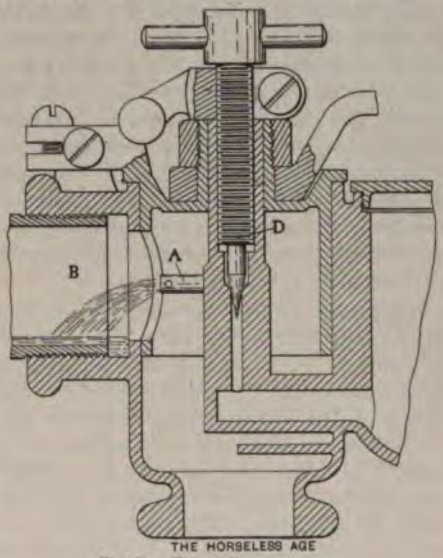
It might be best to construct cars with a ratchet and pawl or other mechanism, so that they cannot be backed without disengaging. Some rather appalling accidents have happened from the inability of the driver to stop when going up grade without sufficient control to hold the car from running backward. A trailing sprag with spike is a rather primitive affair, strongly suggestive of Conestoga wagons and the Lancaster pike.

J. S. Corbin.

Carburetor Troubles.

Editor Horseless Age:

I have noticed W. C. K.'s inquiry concerning his carburetor. I have had a very similar trouble, viz., my engine on being cranked gave one or two "kicks" and then refused to run. I took the carburetor off entirely and the motor ran for some time without it. I then found that the gasoline, the pipes being so cold, did not vaporize, but poured out of the needle



P. D. P.'s Carburetor.

valve D in the accompanying sketch, into the pipe B, where it lay until enough had evaporated to make a "kick" or two. The surface thus becoming agitated, a mixture which was too rich was drawn over and the motor therefore stopped. I cleared the pipe by opening the throttle wide, closing the needle valve entirely and cranking vigorously. I then got someone to crank while I opened the valve A, and the motor started promptly. The trouble can be avoided by opening the throttle a trifle more than customary, thereby reducing the suction. It then requires more cranking, however.

P. D. P.

Cleaning Mica Plugs.

Editor Horseless Age:

What is the best way to clean a mica plug when it becomes oil soaked or partially so? What is the best solution to use in an acetylene generator, or could any solution be used to keep water from freezing? How many pounds of calcium chloride should be used to a gallon of water to form an anti-freezing solution?

S. Holmes.

[To clean a mica insulated spark plug of oil it can be heated thoroughly to a bright red and the oil will therefore be burned out. It is likely, however, that the plug will become oil soaked somewhat more easily after the operation than when new.

The acetylene lamp makers recommend that nothing but water be used in the generator reservoir, and that it be left empty until the gas is to be used. It has been found that common salt may be added as a preventive against freezing, in the proportion of a teaspoonful to a half pint, but its use necessitates the frequent cleaning of the tank, as salt corrodes brass rapidly. Some users have found that alcohol may be added to the water to good advantage.

Five pounds of calcium chloride to one gallon of water makes a good anti-freezing solution. It is well to add a little lime to neutralize what acid may be present.—Ed.]

High Tension Magnetos for Ignition Purposes.

Editor Horseless Age:

I am a constant reader of your paper and was much interested in an article on page 566 of the issue of December 7, entitled "High Tension Magnetos for Ignition Purposes." I should be pleased if you will give me a detailed description of the magneto and coil referred to. Is it necessary to use batteries for starting?

P. J. McCullough.

[A very complete description of both the magnetos and dynamos used for ignition purposes was published in our issue of August 3 last. In brief the system referred to consists of a high tension magneto, which delivers its current to a single specially wound induction coil, from which it is conducted to the various cylinders. Such outfits are now offered on the market. No batteries of any kind are used in connection with them, as the magnetos at a very slow speed will develop a sufficient potential to cause a spark to jump across the points of the plugs, through the compression in the cylinders.—Ed.]

Replenishing Anti-Freezing Solutions.

Editor Horseless Age:

Does your reply to "Motorist" in this week's issue, page 609, refer equally to glycerine solution? I am using a 20 per cent. solution of the latter in my two cylinder Rambler, and have been adding the solution to make up for waste. Am I doing wrong?

W. A. Dolan.

[The same measures should be used in replenishing glycerine anti-freezing solution as in the case of the chloride of calcium solution. The water evaporates and the solution becomes more dense. The solution should be drawn off periodically, the entire system cleaned out and the density of the solution measured.—Ed.]

The Paris Automobile Salon.

By P. M. Heldt.

The seventh annual automobile exhibition in Paris, under the auspices of the Automobile Club of France and the French Automobile Manufacturers' Association, was opened in the Grand Palais and in the building known as the Serres of the Course de la Reine, at 10 o'clock on the morning of Friday, December 9, by the President of the French Republic.

The exhibits in the vast building had been arranged and the decorations completed for the official opening with the utmost haste. Twenty-four hours before the time of opening all was chaos in the big building, and the dust had settled thickly upon everything exposed that had been in place any length of time. A large army of decorators were at work completing the ornamental signs which are a feature of every stand, and a continuous procession of carts and trucks carrying exhibits entered the main entrances. At some of the stands workmen were engaged in cleaning polished metal parts of grease with which they had been covered to protect them against rust in transit, while others were busy wiping and repolishing frames, springs, &c. But by far the greater number of stands had not reached the necessary state of completion for this sort of work, while many were yet entirely bare of exhibits. Considering that the atmosphere was heavily laden with dust, the polishing and wiping of bright parts at that time seemed labor lost.

The writer left the exhibition hall about noon on the day previous to the opening, and was then firmly convinced that the show would be far from complete when the President should make his official tour of inspection. He was therefore agreeably surprised upon entering the building the next morning at 10 and finding the stands almost entirely completed in all respects. The change which had been wrought in the interior of that building in less than twenty-four hours was simply amazing. Where the day previous everything was covered with a layer of gray dust, could now be seen highly polished and scrupulously cleaned metal and varnished surfaces, and the air of freshness pervading the building was augmented by a gorgeous profusion of palms and pot flowers used for decorative purposes. The strains of a band concert poured forth from a gallery.

From 10 o'clock on, a continuous stream of visitors entered the building. At this hour also the President and a number of high public officials (ministers, etc.) put in their appearance to officially open the exposition and make a tour of inspection. The President, M. Loubet, is an elderly, rather meek looking gentleman of small stature, and was dressed as democratically as a President of the United States, in long black coat, and with silk hat, without orders or decorations. Among his cortège, however, were a number of gorgeously decorated gentlemen. The procession passed through the main aisles of the great hall, a detachment of police clearing the way, and stopped at a number of stands of prominent manufacturers, which seemed to have been previously agreed upon. I noticed particularly his conversation with M. Serpollet. If I remember correctly, M. Serpollet was honored by a presidential visit to his stand also on one or two former occasions, and it was therefore not his first experience in entertaining the Chief Executive of the French nation; he acquitted himself of the task most creditably, his bearing reflecting a sense of equality, in contradistinction to the crouching attitude usually observed on similar occasions in countries where monarchical institutions prevail. He at once called the attention of M. Loubet to a vehicle on his stand, which, according to a sign displayed thereon, was the fifth executed by the Serpollet firm for the Shah of Persia, and from the facial expressions, which alone were distinguishable at the distance, and in the din of the band and the crowd, he appeared to suggest that the President of the French nation would do well to also acquire ownership of a self propelled vehicle. M. Loubet, however, seemed not at a loss for an excuse for not yet having joined the ranks of the motorists.

After leaving the Serpollet stand, the presidential procession continued directly to a meeting room at the end of the main hall, from which all unqualified ones were rigidly excluded by a strong cordon of police. There, presumably, the addresses in connection with the opening ceremonies were made. These must have been quite brief, however, for after a short lapse of time the procession continued its round of inspection, stopping at some more stands. As already stated, the stands at which halts were made and where the President indulged in a few moments' conversation seemed to have been carefully selected beforehand, though I do not doubt in the least, from previous experience, that the Parisian press will put it that the President's eye was attracted by the special merit of the goods displayed at these stands.

Inasmuch as the Paris Show virtually inaugurates the coming season, the reader will probably be anxious to know what are the chief points of advancement of the industry as reflected by the exhibits. Owing to the vast number of exhibits and the enormous scale of the Show, this is a thing rather difficult to determine if one wants to be absolutely sure of his conclusions. To say that there are no radical changes and that improvements are confined to details would be a commonplace. I believe that there are very strong indications of several deviations in the general trend of design, such, for instance, as the wholesale adoption of mechanical generators (magnetos) for ignition. But considering that a three to four hours' visit to this vast exposition enables one to inspect only very few of the new models on view, and that to get an adequate idea of tendencies in design one must study at least a majority of the machines exhibited, I beg to be excused from generalizing on this point at the present time, to which I shall revert when I have completed my visits to the Salon.

Immense sums must have been spent for decorative purposes. The organizers, including the Automobile Club of France, have set the example, and ornamental columns have been erected along the Avenue Alexander III in front of the Grand Palais and on both sides of the Avenue des Champs Elysées, where the former meets it. These columns bear the insignia of the A. C. F. and are heavily studded with small colored incandescent lamps, and cables carrying strings of the same kind of lamps extend between adjacent columns. A few of the columns bear decorations appropriate to the occasion, such as moldings of wheels, gears, steering hand wheeds, motors, etc. The building itself is also handsomely decorated on the outside.

The decorations of the stands are of the most varied character. As a rule, however, there is at every stand what may be described as a sign board, supported on one or more columns on each side. The great majority of these column supported signs are of wood, tastefully designed as regards outline, and finished by decorators and sign painters. A few are made of sheet iron scrolls riveted on to flat iron supports. Of this description are the stands of Clement-Bayard and of Renault Brothers. A few of the signs comprise heavy ornamental forged iron work, which is employed so much in building construction in Germany. At least three distinctive types of national decorative art are represented at the Salon—the French in the majority of stands, the English in the stand of the Hozier Engineering Company, and the new German decorative art in the stand of the Cudell Motor Company.

The stand of De Dietrich & Cie. is also of typical German construction. Among the best decorated stands, in the writer's opinion, are those of the firms of Krieger, Clement-Bayard, De Dietrich, Delaunay-Belleville, Darracq, Decauville and Hotchkiss. The management of the Show each year conducts a competition for the best decorated stand, which gives an incentive to elaborate and expensive decorative work. The annual Salon must be a regular harvest to decorators and carters, both of which trades are well represented in the French capital. It seems that there is much competition for the work, and that exhibitors are annoyed by the representatives of the respective firms while engaged in installing their exhibits, as signs were displayed in the Grand Palais the day previous to the show, to the effect that any "contractors" soliciting work from

exhibitors in the building would be barred from doing work there.

With the decorative sign structures, palms, ferns, etc., the achievements of the art of decoration are almost more prominent in the building than are the automobiles. These elaborate and gaudy decorations are undoubtedly instrumental in drawing to the Show vast crowds of Parisians having little direct interest in automobiles, and are therefore a feature highly desirable from the standpoint of the organizers, who long for large gate receipts and record attendances. Whether they are also desirable from the standpoint of the exhibitors is an entirely different question.

The Show this year extends from December 9 to 25, inclusive, and is open every day, Sundays included, from 10 a. m. to 6 p. m. The usual admission price is 1 franc (20 cents), but on the opening day it was 5 francs, and on certain other special days it will be 3 francs. The exhibits are divided into fifteen classes, of which the first class comprises all kinds of pleasure automobiles and motorcycles; the second class, heavy goods vehicles; the third class, bicycles, etc. It will thus be seen that the Paris Salon continues to be a combined automobile and bicycle show. There are also classes for motor boats and for aerial navigation appliances.

The Show is international, not only in principle but in actuality. Besides the exhibits of the predominant French industry may be seen cars and parts of English, German, Swiss, Italian, Belgian, Dutch and American construction. The American industry is worthily represented by the Pope Motor Car Company and the Olds Motor Works. The stands of both firms are well stocked with complete vehicles and chassis, and on the Olds stand is seen the chassis with glass panels, in which sections have been cut away from parts of the engine, to show their method of operation—the same which has been seen at so many American shows. On another Oldsmobile chassis (of a tonneau) all the rods, levers and bell cranks are polished, as is the custom at the Paris Salon.

There are about a dozen American exhibitors, but apparently only four who exhibit complete automobiles made in the United States, viz., the Olds Motor Works, the Pope Motor Car Company, the Pope Manufacturing Company and the Worthington Automobile Company. I did not notice the stand of the last named during my first day's visit to the Show; but find it mentioned in the official catalogue as one of the exhibitors. Among the American made parts shown may be mentioned a Veeder speed indicator, by Markt & Co.; a Dayton dynamo generator, by Glaenzer Frères, and a pair of phares Solar on one of the Pope-Toledo cars.

The official catalogue, which is of the same convenient size of page as in previous years, though even more voluminous, enumerates no less than 784 exhibitors in the Grand Palais and 200 in the supplementary building. As quite a number of firms exhibit in both places and some also in several classes in the Grand Palais, the actual number of exhibitors is considerably smaller than the sum of the above two figures. According to the list published in the official catalogue, it would appear that twenty-six exhibitors are German or handle exclusively vehicles or parts made in Germany; fifteen are British; thirteen Swiss; twelve American; seven Italian; six Belgian; two Austrian; one is Dutch and one Russian.

As has been mentioned in THE HORSELESS AGE before, there was a keen rivalry among exhibiting firms for stands on both sides of the main aisle through the main hall in the Grand Palais. In order that these most desirable spaces should be secured by the most deserving firms, and the best products of the French automobile industry thus be displayed most conspicuously, the management reserved eighteen stands of 800 square feet each, two deep on each side of the main aisle, and organized a competition for these spaces among all exhibitors in which the age of the firm and its participation and success in former shows, and in races and other competitions, were the deciding factors. The spaces were divided by lot among the eighteen standing the highest in this competition. Following is a list of the eighteen manufacturers who have thus been pronounced leaders in the French automobile industry: A. Clement-Bayard, Leon Bollee, Gobron, Renault, Georges Richard-Brazier, Automobile Peugeot, Peugeot Frères, Darracq, Krieger, Gardner-Serpollet, Panhard et Levassor, Brouhot, De Dietrich, Decauville, Mors, De Dion-Bouton, Delaunay-Belleville and Gladiator. The spaces have an area of 80 square metres (800 square feet about), and cost 4,000 francs each.

While the main hall is crowded with exhibits, this cannot be said of the smaller halls and the galleries, of which the big building has many. As the main hall is so immense, and even an only superficial examination of all its exhibits would occupy several days, exhibitors in other parts of the building are at a great disadvantage; besides, the smaller halls are not nearly so well lighted as the main hall, with its arched glass roof.

While the exhibition in general presented an appearance of completeness at the time of opening, nevertheless a couple of workmen were still polishing and cleaning at nearly every stand. However, the work of cleaning and wiping off dust will probably have to go on uninterruptedly, as the building is unusually dusty. The main aisles are covered with a coarse gravel, on which the walking is not particularly pleasant. The one feature which more than any other bespoke backwardness of preparations was that not one out of ten exhibitors had descriptive literature on hand on the opening day, and in a number of cases inquiry elicited the information that the catalogues would be ready only in about a week. This delay may be partly the fault of the catalogue printers, who, to judge from the typographical work in the average French automobile catalogue, are not leaders in their line.

(To be continued.)

Italy's War Automobiles.

An interesting and successful trial of automobiles, under the auspices of the Minister of War, was held this month, in which it has been demonstrated to the entire satisfaction of those concerned that automobiles can be used to advantage in war times. As horses owned by private persons are subject to requisition by the military authorities in the event of war, an attempt will be made to render automobiles subject to the same law.

Fifty owners of automobiles were invited to take part in the manœuvers, and of these thirty responded. Thirteen routes were selected, leading to various points on the eastern, western and northern frontiers. All covered a considerable length, and many were difficult. One led to the fortress of the "Spluga," lying at an altitude of 2,107 metres (6,909 feet) above sea level, and another to the "Stelvio," at a height of 2,756 metres (9,042 feet), which is the highest carriage road in Europe.

At dawn, September 1, each chauffeur of the thirty automobiles participating left the town of Brescia by a certain gate, and then opened a sealed order containing the route laid down for him. In view of the supposed invasion of the country by an enemy the routes were selected with regard to safety as well as speed. The distance had to be covered within twenty-four hours, and the military authorities made every preparation for verifying the routes, time of departure and arrival, etc.

Two cannons were transported by the automobiles, and supplies were taken to fictitious military camps. In rapid delivery of important supplies, such as heliographs, field telephones, etc., and for many other strategical purposes, it was found that the new service went beyond all expectations. The longest distance covered was 540 kilometres (335 miles).—Harlan W. Brush, Consul, Milan, Italy.

Cliff Hetherington, who has been thinking of buying an automobile, lately went to Kansas City to investigate the subject. The agents for steam machines abused the gasoline machines, and agents for gasoline machines abused steam machines. Both abused the electric machines, so Mr. Hetherington became convinced that all automobiles are worthless. He therefore gives notice to agents that he is out of the notion of buying, and they are requested to let him alone.—Atchison Globe

LEGISLATIVE AND LEGAL.

New Ordinances in St. Louis.

St. Louis, Mo.—The St. Louis Automobile Club has prepared an ordinance which, it is hoped, will supersede the present one, under which automobilists are compelled to pay an annual fee of $10. and the tax for a single horse drawn vehicle is $1.50, and for a six horse truck $15. The new measure provides for licensing passenger automibiles, according to the number of seats, with a minimum charge of $3. In addition to this ordinance, two others affecting automobiles are also to be introduced. One fixes the rate of speed at 15 miles per hour during the daytime, and 10 miles at night. The third ordinance requires that the license plate shall be secured to the rear of the automobile in such a manner that it will not swing, and provides that each car shall carry at night a lighted lamp, throwing a red light to the rear, and a white light upon the license plate. This is to render the license number discernible at night as well as in the day time.

Want Separate Roads for Automobiles.

Waterbury, Conn.—Farmers in the town of Kent have recently drawn up and circulated for the appending of signatures a petition which they expect to present to the Legislature at its coming session. A part of the petition is given below:

"We, whose names are herein signed, are citizens of Connecticut and town of Kent, of the age of twenty-one years and over, and we petition your body that an act may be passed prohibiting automobiles or vehicles whose motive power is steam, gasoline or electricity from use of country roads of this State, on the grounds that country highways being generally narrow, with many sudden curves and dangerous places, and from the extreme liability of automobiles to frighten horses, are unfit courses of travel for such, and being a pleasure vehicle of a comparative few render the roads unsafe for the many who must of necessity travel the roads. And we believe laws regulating speed or making owners of automobiles liable for damages are and will be difficult of enforcement in country districts. We therefore pray they may be prohibited from travel on country roads of this State."

Wilmington, Del.—The new automobile ordinance has been presented to the city council, and has been referred to the law committee.

St. Paul, Minn.—It is reported that "sharpers" have lately played the magistrate-constable game on unsuspecting motorists on the roads in the outskirts of the city.

Long Island City, N. Y.—Referee in Bankruptcy Charles A. Tipling has arranged for a meeting of the creditors of the Gibbs Engineering and Manufacturing Company, of Glendale, makers of electric trucks. The concern was forced into bankruptcy by an involuntary petition filed by some of its creditors. The schedules of liabilities and assets have just been completed, and they show debts amounting to $168,729.33, and assets down as $140,966.21. The concern has 285 creditors, and there are preferred claims for wages due amounting to $1,600.

Toledo, Ohio.—The Pope Motor Car Company has been made defendant in a suit for $300, brought by Thomas Gimmel, who alleges that his wife was injured and wagon damaged when his horse took fright at an automobile owned by the company.

Utica, N. Y.—L. N. Southworth, as trustee in bankruptcy for the defunct Remington Automobile and Motor Company, has brought suit to compel the stockholders of the company to pay a balance claimed to be due on the stock subscribed for and purchased by them.

Chicago, Ill.—The Pegasus Automobile Company is suing the Royal Automobile Company to regain possession of $6,000 worth of property which, it is alleged, was conveyed to them through misrepresentations.

St. Cloud, Minn.—W. D. Mereckel, of Minneapolis, who is being sued by Catherine Blenker for the loss of her husband, who was killed, it is alleged, by the defendant's automobile last summer, has petitioned for a change of venue on the ground that a prejudice exists in Stearns County against automobilists.

For Good Roads in New York.

The New York State Legislature at its coming session will be asked to make an appropriation of $4,000,000 for road improvements under the Higbie-Armstrong act, and also to authorize a $50,000,000 bond issue for carrying out an extensive plan of highway construction devised by State Engineer Bond. This program was outlined on December 10 at a meeting of the executive committee of the Good Roads Convention of delegates representing the boards of supervisors of the State, which will be held in Albany on January 24 and 25.

The bond issue plan has been discussed throughout the State before boards of supervisors, highway conventions, farmers' institutes and grange meetings, and wherever it has been explained is said to have met with the approval of those who want to develop roads leading to the present shipping centres.

New Incorporations.

The East Coast Automobile Company, Jacksonville, Fla. Capital, $10,000. Incorporators: P. L. Sutherland, Guy R. Champlain, E. A. Groover, A. D. Covington and A. S. Hubbard.

Simplex Motor Company, Mishawaka, Ind. Capital, $100,000. Directors: Ed. J. Gulick, Randolph A. Kamin and Harry L. Bell.

Park Automobile Company, St. Louis, Mo. Capital, $10,000. Incorporators: Alexander T. Primm, Jr., Samuel S. Primm, Charles E. J. Thomas.

South Side Automobile Company, St. Louis, Mo. Capital, $5,000. Incorporators: Wm. R. Orthwein, Newman Samuel, Louis A. Hoerr, John Hoerr, Jr., Henry W. Hoerr.

Commercial Automobile Company, Chicago, Ill. Capital, $5,000. Incorporators: Paul Carpenter, Albert G. Miller, Albert C. Howard.

Duquesne Construction Company, Jamestown, N. Y. Capital, $40,000. To manufacture automobiles. Directors: William J. Maddox, Bremer D. Phillips, of Jamestown; Frank L. Bliss, of Corry, Pa.

Trade Literature Received.

The Elmore Manufacturing Company, Clyde, Ohio.—Pamphlet containing information concerning 1905 Elmore Pathfinder cars.

J. H. Saris, Beloit, Wis.—Leaflet regarding the Saris automatic carburetor.

The Concentrated Acetylene Company, Indianapolis, Ind.—Folder regarding the "Pent-O-Lite" generators.

A. L. Dyke, 311 Pine street, St. Louis, Mo.—Leaflet showing new line of automobile specialties.

The Clark Ball Bearing Company, 505 Flatiron Building, New York.—Catalogue of Clark ball bearings.

W. O. Felt, 34 East Thirty-fourth street, New York.—Illustrated folder showing "Cape-London" automobile tops.

Thomas B. Jeffery & Co., Kenosha, Wis. —The December number of the *Rambler Magazine*.

The Federal Manufacturing Company, Cleveland, Ohio.—The *Automobile Builder* for December.

Peerless Motor Car Company, Cleveland, Ohio.—Folder giving advance information concerning 1905 Peerless cars.

The Acme Motor Car Company, Reading, Pa.—Pamphlet containing testimonials from users of their cars.

W. H. Anderson & Sons, Detroit, Mich. —Catalogue of automobile and gas engine forgings.

Out-of-town subscribers of The Horseless Age, who intend visiting the New York Automobile Show, are requested to communicate with the Editor, if possible mentioning the name of the hotel at which they will stop when in the city.

Club Notes

NEW JERSEY A. C.

A smoker and vaudeville entertainment was held by the club on last Saturday evening in the banquet hall at Achtel Stetter's on Broad street.

GRAND FORKS A. C.

The monthly meeting of the club was held on Monday last, in the Clifford Building. Plans for next season's touring campaign were discussed.

SYRACUSE A. C.

At a meeting of the club held on December 7, Mr. Frank Z. Wilcox made an address on the "good roads" question, dealing particularly with conditions upon the local highways.

BUFFALO A. C.

At the meeting of the board of governors held on Tuesday last the chief subject of discussion was the plans for the new quarters, which are to be in the Teck Building. At a recent meeting the membership committee received fifteen new members.

CHICAGO A. C.

Several machines having been stolen recently, the board of directors voted at their meeting last Friday to take steps toward checking the nuisance. An attorney, S. S. Gorham, was appointed to press all such cases to the fullest extent of the law.

WAYNE COUNTY A. C.

At the next meeting of the club, to be held on January 20, a paper will be read on the subject, "The Laws of Other States." Legislative matters will be discussed and plans laid for co-operation with other local organizations to secure fair consideration by the Assembly.

L. I. A. C.

A business meeting of the club was held on the evening of Wednesday, the 14th, at 60 Cumberland street, Brooklyn. The principal business was the adoption of a revised constitution and bylaws. The alterations on the new clubhouse are progressing rapidly and will soon be entirely completed.

KANSAS CITY A. C.

Members of the club and their wives dined at the Midland Hotel on the evening of the 12th. At a business meeting in the evening it was decided to suspend temporarily the $10 fee for initiation in an effort to increase the membership. A solicitor will be sent to the various motorists who are not members to try and interest them in the work of the club. It was decided not to act at present in regard to the proposed clubhouse.

FLORIDA EAST COAST A. A.

Mr. C. G. Burgoyne, president of the association, has resigned on account of ill health, and his place has been taken by Mr. Edward M. Steck, of Philadelphia. Mr. Steck has been in New York during the week consulting with well known local motorists in regard to the forthcoming meet at Daytona. It has been decided to conduct the meet in accordance with the wishes of the owners of the high powered cars, subject to the approval of the association.

A. C. OF NEW BRITAIN.

At a meeting of the club held on December 2 a formal organization was adopted and the following officers chosen: President, Philip Corbin; vice presidents, Howard S. Hart, George M. Landers; secretary, W. L. Hatch; treasurer, George L. Damon. Action was taken looking toward better enforcement of the lantern law for all vehicles. The club boasts thirty-nine charter members.

SYRACUSE A. C.

At a meeting held on December 7 the club put itself on record as condemning the toll road system, and endorsing Assemblyman Cadin in his efforts to secure legislation against it. Officers of the club are investigating the matter of putting up signs on the main highways. A vote of thanks was tendered the H. H. Franklin Company for the banquet given by them to the St. Louis tourists last July. The following members were appointed a committee to arrange the annual club banquet to be held during the first week in January.

BUFFALO AUTOMOBILE TRADE ASSOCIATION.

At a business meeting held on the 12th it was decided that the supervision of the Show to be held next March shall be in the hands of the executive committee. Dai H. Lewis was appointed manager of the event. The election of officers resulted as follows: President, E. R. Thomas; vice president, J. A. Cramer; secretary, C. W. Roe; treasurer, John J. Gibson; members executive commitee, E. C. Bull, P. W. Eigner and J. B. Eccleston. Mr. Lewis was at first elected secretary, but immediately resigned, as he is already secretary of the Automobile Club of Buffalo.

A. C. A.

Magistrate Crane lectured before the club on the 13th on the "Automobile and the Magistrate." His effort was to show it to be the duty of the club collectively and individually to so conduct itself as to mold popular sentiment into an attitude favorable to the automobile. He made caustic reference to several recent occurrences whose influence had been of an adverse nature, criticising the offenders freely. Speaking of the present automobile laws he said: "They should be more comprehensive and more exacting. There should be a $50 penalty for a first offense, $100 and imprisonment for ten days for a second offense, for a third $200 and twenty days, and for the rest in order." Later he emphasized the importance of never allowing chauffeurs to take out the cars for their own uses. A smoker and vaudeville entertainment will be given at the clubhouse on the evening of December 20.

Commercial Vehicle Notes.

There is a probability that the New York Fire Department will place a motor propelled fire engine in service in the near future.

The title of automobile engineer has been created by the Municipal Civil Service Commission of New York, and the operators of the automobiles used in the various city departments have been added to the classified list.

The Pawtucket, R. I., Merchants' Association is considering the feasibility of an automobile express line between that city and Boston, which shall pass through the Attleboros and Taunton, Mass. The total distance is about 40 miles, and the roads are good.

Importers' Salon.

The announcement is made that the commencement of the Importers' Automobile Salon, to be held in Herald square during the week of January 11, will be marked by a formal opening on the evening of the 10th, to which admission will be by special invitation only. A special program has been prepared for the occasion.

A long list of authorized patrons is announced, which includes the various ambassadors and ministers to this country, the officers of the A. A. A., and many of the more prominent motorists.

Ormond-Daytona Program.

The unexpected donation of several new trophies made necessary a complete revision of the program of the meet, as originally drawn, and much confusion has resulted from the various unofficial announcements of the events to be run. The racing board of the A. A. A., which has taken up the matter, now issues a statement of the affair, giving a list of twenty-eight events, ranging in character from a 1 mile time trial for stock cars weighing 550 to 850 pounds to the headline feature, the 100 mile international race for the Vanderbilt Cup.

American Team in the Gordon Bennett Race.

The entry of an American team for the Gordon Bennett Cup race has been cabled to the A. C. of France. There are three candidates for a place on the team. They are: The Pope Motor Company, whose entry was noted last week; Dr. H. E. Thomas, of Chicago, who has entered a 90 horse power Locomobile, and D. T. Muir, of Lexington, Ky., with a 90 horse power Pope-Toledo. These cars must be placed at the disposal of the racing committee of the A. C. A. on May 1, 1905, for a series of tests to determine the make up of the team. It is likely that all of the cars will enter for the speed trials at Ormond in January, and if that is the case it is probable that no further trial will be made.

MINOR MENTION

It is reported that the Columbus (Ohio) Motor Vehicle Company has gone out of business.

We are advised by Mr. Winter that the Geer-Winter Company, of Elyria, Ohio, has been dissolved.

Harris & Grimes, of Pleasant street, Leominster, Mass., have opened a repair shop for automobiles.

It is announced that an automobile tournament will be held in Havana, Cuba, beginning February 4.

Murphy & Co., of Minneapolis, Minn., have erected a new garage at Fourteenth street and Hennepin avenue.

The Motor Car Company of New Jersey has secured the agency for Newark of the Winton and Packard cars.

Horace B. Hills, Jr., has secured the Boston agency for Mercedes cars, and has opened offices at 5 Park square.

J. J. Mandery has denied the rumor that he has sold his interest in the Rochester (N. Y.) Automobile Company.

S. Fischel is building a large garage building at the corner of Willson and Payne avenues, Cleveland, Ohio.

Rollin White, designer of the White car, was awarded a gold medal by the judges at the Louisiana Purchase Exposition.

The Reliance Automobile Manufacturing Company, of Detroit, have recently increased their capital stock to $400,000.

The Field Motor Carriage Company has been organized in Auburn, Me., to manufacture steam propelled motor vehicles.

W. O. Felt, of 34 East Thirty-fourth street, New York, is now making a line of "Cape-London" tops for automobiles.

There is a movement on foot to organize an automobile club among enthusiasts who reside in the upper West Side of New York city.

The Springfield Hat and Cap Company have changed their name to Rubber Appliance Company, and are putting out a line of automobile specialties.

The Regas Automobile Company, of Rochester, N. Y., expect to build a four cylinder car for next year, equipped with a side entrance tonneau body.

The Marion Motor Car Company, of Indianapolis, Ind., expect to move their assembling and finishing department into a new two story building by January 1.

The Hartford (Conn.) Y. M. C. A. will open an automobile school on February 1. Two courses, one for men and the other for women, will be conducted by H. W. Alden.

The C. T. McCue Company has been organized in Hartford, Conn., to manufacture automobile fronts, including, it is said, steel frames. The incorporators are Charles T. McCue and Frederic C. Billings, of Hartford, and Herbert A. Wiley of Boston.

The Monarch Automobile Company, of 218 La Salle street, Chicago, expect to build a $500 runabout for 1905, and have applied for space at the Chicago show.

The Standard Automobile Company, of New York, has purchased the garage and b siness of the Central Automobile Company, on Broadway near Fifty-third street.

E. G. Struckman and Charles Cotta have recently been conducting negotiations with a view to establishing an automobile truck manufacturing concern in Aurora, Ill.

The Concentrated Acetylene Company, of 330 North Illinois street, Indianapolis, Ind., have brought out a new acetylene generator, the feature of which is its ability to store gas.

Walter O. Adams has resigned as assistant business manager of the Ford Motor Company, and has been appointed manager of the export sales department of the Olds Motor Works.

The Simplex Motor Car Company, of Mishawaka, Ind., has filed articles of incorporation. The capital stock is $100,000 and the directors are E. D. Gulick, Rudolph Kamm, and H. L. Bell.

Amended articles of incorporation of the Mitchell Motor Car Company, of Racine, Wis., have been filed, by which the capital stock of the company is increased from $300,000 to $500,000.

The James Brown Machine Company write that they have made a contract with the E. Noceti Company, of Buenos Ayres, by which that concern secures the agency for Cameron cars in Argentine Republic.

The James Brown Machine Company, of Pawtucket, R. I., are building a six cylinder Cameron racer of 50 horse power. They have also started a larger car, equipped with a 90 horse power eight cylinder motor.

The Associated Cyclists' Clubs of New York have promoted an automobile race from New York to Tarrytown, to be run after midnight on January 1, 1905, following the idea of their annual bicycle race.

Alden Sampson, 2d, of Pittsfield, Mass., has purchased the capital stock and property of the Crest Manufacturing Company, of Cambridge, Mass., and thus becomes a member of the Licensed Association of Automobile Manufacturers.

F. S. Blanchard & Co., of Worcester, Mass., have recently published the Interstate Automobile Register and Tourists' Guide, which contains the registry lists of the various States, State laws and local ordinances, and information pertaining to touring.

On December 13 Barney Oldfield, driving the Peerless Green Dragon at Fresno, Cal., broke all world's records for from 25 to 50 miles on a track. The former was done in 23:31 1-5, and the latter 48:39 1-5. The 15 mile record was also broken, his time being 14:03 3-5.

The Hiland Automobile Company has recently opened a new brick garage at Beatty and Baum streets, Pittsburg, which is said to be equipped with the most modern appliances, and to have storage room for thirty-five cars. The company has the Autocar agency for 1905.

There is talk of a hill climbing contest up Pike's Peak, to be held in August, 1905. The total climb would be about 8,000 feet on a road 14 miles long. If the idea is carried out, it is probable that the event will be held under the auspices of the Overland Racing Association of Denver, Col.

The Napier Motor Car Company, of Boston, and Norris H. Mason, are the last to be allotted space at the New York show. It has been found necessary to make use of the second balcony on the Fourth avenue side of the Garden, to supply the demands for space. It is said that all has been allotted that is available.

The Curtin-Williams Automobile Company has been organized in Columbus, Ohio, and the following officers elected: Thomas E. Curtin, president; Roy Williams, vice president; Fred Wardlow, secretary and treasurer. These, with Charles Wardlow and Dr. Yateman Wardlow, form the board of directors.

Fire Commissioner Hayes, of New York city, has revoked the garage license of the Michelin Tire Company for their place at 132 West Twenty-seventh street upon learning that some 200 people are employed on the floor above them. A careful inspection is being made of all garages at the present time to find if the laws regarding the storage of gasoline are being obeyed.

At the last meeting of the executive commitee of the National Association of Automobile Manufacturers it was voted to again make an attempt to test the constitutionality of the various laws requiring automobilists to take out licenses. A committee was appointed to confer with counsel and to report at the January meeting. It was also decided to hold a smoker and entertainment instead of the annual banquet at the time of the New York Show. The annual meeting will be held on January 18.

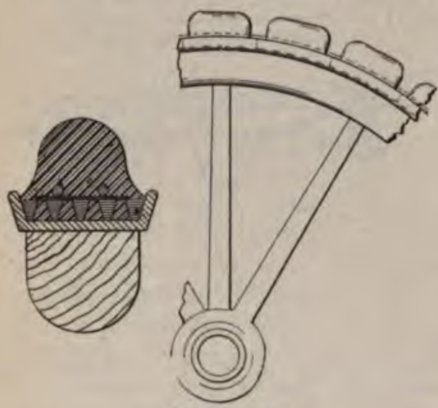
Articles of incorporation have been drawn up for the Broadway Automobile Company, of Seattle, Wash., with a capital of $15,000, which is to conduct a general garage and automobile sales business, having secured the agency for Winton and Cadillac cars. A new building has been erected for the purpose at Madison street and Broadway. The officers of the company are F. A. Wing, president; W. G. Norris, vice president; C. L. Roy, secretary; Edward W. Herald, treasurer. The trustees are C. L. Roy, W. G. Norris, H. B. Hallam, Joseph W. Parker and F. A. Wing.

MOTOR VEHICLE PATENTS.

United States Patents.

777,294. Vehicle Tire.—Arthur H. Marks, of Akron, Ohio. December 13, 1904. Filed March 14, 1904.

A method of constructing a rubber pad tire, with special provision to prevent the pads from tearing away from the base under unusual load. A pair of endless bands of wire rope surround the rim, and are embodied in the structure of the tire. The basic portion, in which the bands lie, is of woven fabric, either canvas or wire,



No. 777,294.

and the tread pads are either dovetailed into place or cast directly with it to form the completed structure. The pads are made separately, each having its base projecting longitudinally, so that with the like projection of its adjacent pad a distance block or spacer is formed between each pair. Repairs may be made by cutting the retaining bands on either side of a faulty pad, and substituting a new one for it, afterward reuniting the bands.

777,295. Speed Regulator for Explosive Engines.—Georg Marx, Jr., of Nuremberg, Germany. December 13, 1904. Filed March 3, 1903.

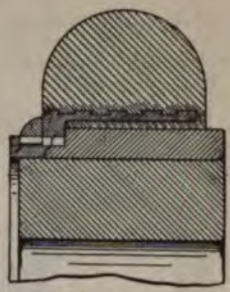
A valve governing mechanism for explosive engines, which regulates the charge by varying the point of opening and travel of the inlet valve, its point of closure being unvariable. The action is operated by an eccentric which moves a rocking lever through the medium of a trip gear. The lever is pivoted to the valve yoke at one end, and fulcrumed near its centre upon a second lever whose position is regulated by the governor. In operation the eccentric draws the first lever downward until it brings up on the second, when it levers upon this to lift the valve yoke and open the valve. At a certain fixed point the trip gear releases, and the valve is instantly closed by a spring. At the same time the actuating lever is returned to its original position by a spring dashpot. As the eccentric reaches its backward position the trip engages the lever and repeats the movement. The lever which serves as a fulcrum for the mechanism is so connected with the governor that it is moved toward or away from the valve by the action of the latter. In this manner the time when the valve starts to open is varied, and the amount of travel as well. The point of closing is fixed, the release always occurring at the same point.

777,314.—Fastening for Massive Tires.—Wilhelm Struck, of Friedenau, Germany. December 13, 1904. Filed June 3, 1904.

A method of attachment for heavy tires. A solid rubber tire has a metallic core which projects inwardly from one side at the base to form a flange. The metallic rim of the wheel is slotted circumferentially at one side to receive the flange. The rim outside the slot is notched radially to the same depth, and an annular ring, made with inward projections which fit the notches, is slipped over the rim to completely fill the slot. When the ring is slipped around the wheel the projections pass away from the notches and leave it locked in place.

777,460. Regulatable Power Transmission Device.—Frank V. Whyland and Clarence P. Hollister, of Pittsfield, Mass. December 13, 1904. Filed March 4, 1904.

This is a transmission in which all gears are constantly running in mesh. The power distribution is by means of independent clutches. The gears are made in the form of annular rings, and normally ride free on the faces of corresponding disks within. These disks, which are keyed to the driving shaft, are in two parts, so arranged that they may be moved toward or away from each other to frictionally engage or release the inner surfaces of the gears. This action is obtained by forcing two wedges between the parts of the clutch disks. The motion of the wedges is secured by the longitudinal motion of a wedge bar within the bore of the shaft. A spiral spring keeps this in a normal position, its motion being effected



No. 777,314.

through the medium of a pair of bell crank levers, actuated by a cone which slides upon the outside of the shaft. A yoke connected with the operating lever moves this back and forth. A second yoke rides in a collar pinned to the shaft, and is used to move it longitudinally to bring the wedge bar into successive engagement with the different gears.

777,108. Reciprocating Engine.—Charles King, Ashford, England. December 13, 1904. Filed January 12, 1904.

777,120. Automatic Lubricator.—James Meehan, St. Charles, Ill. December 13, 1904. Filed December 24, 1903.

777,158. Frictional Clutch Pulley.—Geo. S. Tiffany, Tecumseh, and Edwin C. Sword, Adrian, Mich. December 13, 1904. Filed February 16, 1903.

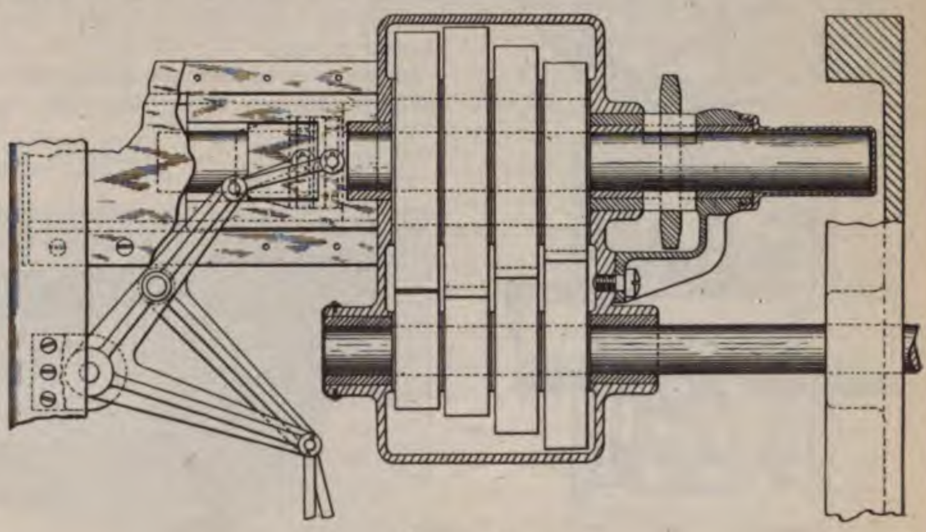
777,220. Carburetor for Explosive Engines.—Fred Patee, Indianapolis, Ind. December 13, 1904. Filed October 24, 1901.

777,229. Power Transmitting Mechanism.—Charles C. Vaughn, San Francisco, Cal. December 13, 1904. Filed March 31, 1904.

777,243. Axle.—Chancy P. Clark, Chattanooga, Tenn. December 13, 1904. Filed August 3, 1904.

777,260. Stepper Attachment for Automobiles.—Henry M. Landes, Sacramento, Cal. December 13, 1904. Filed March 14, 1904.

777,275. Packing.—Albert L. Cole, Auburndale, and Jasper L. Sackett, Melrose, Mass. December 13, 1904. Filed May 15, 1903.

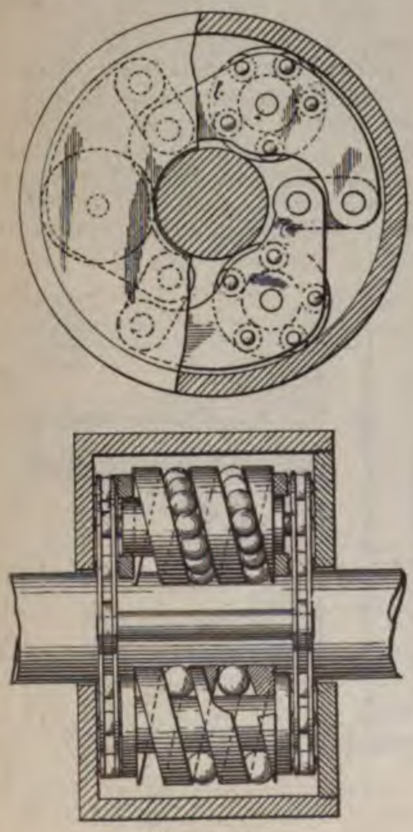


No. 777,460.

No. 777,617.

777,479. Roller Bearing.—John William Moakler, of New York, N. Y. December 13, 1904. Filed August 3, 1903.

This invention is a ball mounted roller bearing arranged to adapt itself to conditions of wear. The rollers are surrounded by spiral springs between whose turns are a series of balls. The cross section of the springs being trapezoidal, the balls are retained in position when the shaft has been removed. Any longitudinal stress upon the bearing will tend to compress the springs, and by thus enlarging the diameter of the roller, to relieve the balls of the added load. The rollers are mounted in a series of plates made up of pairs of flat links, between which are a set of balls which bear upon washers which rest against the ends of the springs and against the ends of the bearing. The retaining links are connected by tie links, which are joined upon pins to form a flexible cage surrounding the shaft.



No. 777,479.

777,548. Motor Vehicle. — Charles Schmidt, of Detroit, Mich. December 13, 1904. Filed June 22, 1903.

This invention is a special construction for the ends of the live rear axle of motor vehicles. A flat plate is formed on the upper side of the part to receive the spring. Adjacent to it is an upward projecting arm, which serves as an anchor for the brake. A clevis is formed on the front side to receive the end of a distance rod extending diagonally upward to the frame, and distributed about it symmetrically, in a plane at right angles to the axle, are several sockets, which embrace the ends of strengthening rods, which brace the differential casing. The main portion constitutes a bearing for the axle.

777,617. Inflatable Vehicle Tire.—Jay W. Farnoff, of Buffalo, N. Y. December 13, 1904. Filed January 21, 1904.

This patent describes the structural arrangement of a single tube clincher tire. The tube proper rests upon a filler or supporting section of rubber or other firm material which comprises a reduced central portion, and oppositely extending flanges which form a base suitable to support the tire upon the rim. Layers of fabric are wrapped about the whole, and the structure is cemented together by suitable filling material, and is then vulcanized.

777,292. Wheel Tire.—Arthur H. Marks, Akron, Ohio. December 13, 1904. Filed September 23, 1903.

777,293. Vehicle Tire.—Arthur H. Marks, Akron, Ohio. December 13, 1904. Filed January 2, 1904.

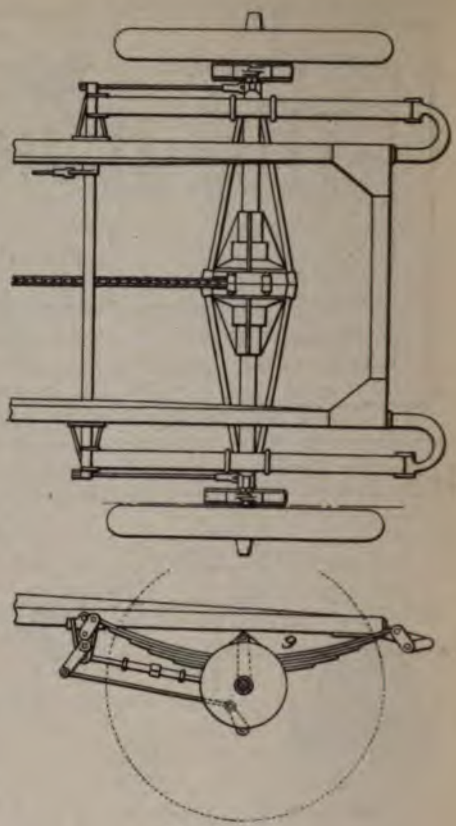
The invention consists of the attachment of a hollow figure, preferably that of a horse, to the front part of a motor vehicle supported on a pivoted wheel. The interior of the figure can be used for storage purposes.

777,343. Variable Speed Power Transmission Device.—William F. Howe, Chicago, Ill. December 13, 1904. Filed November 16, 1903.

777,356. Acetylene Gas Generator.—Bartow A. Warlick and Alfred S. Bucher, Atlanta, Ga. December 13, 1904. Filed October 21, 1903.

777,360. Rotary Engine.—William Wyand, Collingswood, N. J. December 13, 1904. Filed May 21, 1904.

777,364. Cylinder Cock.—Charles B. Alvis, Las Vegas, N. M. December 13, 1904. Filed June 8, 1904.



No. 777,548.

777,302. Rotary Motor.—John Osveimsky, Kamishlov, Russia. December 13, 1904. Filed December 1, 1903.

777,369. Motor Vehicle Attachment.—Henry Hayes, Denver, Col. December 13, 1904. Filed May 16, 1904.

777,371. Speed Indicator.—Charles G. B. Holman, Norfolk, England. December 13, 1904. Filed June 13, 1904.

777,383. Coupling.—Christ Matson and Peter Robertson, Racine, Wis. December 13, 1904. Filed June 6, 1904.

777,390. Carburetor.—Andrew J. O'Shea, Fargo, N. Dak. December 13, 1904. Filed February 25, 1904.

777,398. Vehicle Jack.—Louis A. Casgrain, Winchester, Mass. December 13, 1904. Filed March 7, 1904.

777,481. Hydrocarbon Burner and Water Feed Therefor.—Edwin G. Mummery, Detroit, Mich. December 13, 1904. Filed February 21, 1903.

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The Paris Show.

As has already been stated in these columns, in a note based on telegraphic reports, the Paris Show this year exceeded in magnitude and general excellence every one of its predecessors. Not only was all the available space in the big "Grand Palais" taken up with exhibits, but another spacious building nearby was turned into an exhibition hall for showing motors in operation, machine tools for manufacturing automobile parts, etc., and was completely occupied.

In comparing the Show just past with its immediate predecessor, the most marked advance was undoubtedly in the number of exhibitors and in the aggregate area of floor space occupied. Few radical changes in design were noticeable, the more prominent firms particularly seeming to have adhered closely to their former models. The new mechanical tendencies developed are fully reported in an article in another part of this issue, and need not be considered here. A few words regarding the organization of the show itself will, however, be apropos.

As compared with American automobile shows, the Paris Show is more of a general public event, in contradistinction to a trade event. Great efforts are made to insure a large attendance, without much regard to quality of same. The admission price is made very low, and exhibitors are encouraged in every possible manner to go to the expense of elaborate and tasty decorations, so that the Show offers inducements for a visit not only to those interested in the latest advance of automobile construction but also to those who wish to spend an afternoon among pleasant surroundings, such as are afforded by the gay decorations, the animated throng and the brilliant illuminations in the evening. To those really interested in automobiles there was so much to see and to study in the machines themselves that there was absolutely no need of elaborate decorations to hold their attention, but evidently a goodly portion of the visitors to an automobile show expect to be entertained rather than instructed, and this class of visitors deserve the fullest consideration.

A further inducement to the diversion seeking public to attend the Show was found in the fact that exhibits were not limited to automobiles, parts and appurtenances, but included a variety of extraneous articles. A considerable portion of the space in the Grand Palais was taken up by an exhibit of household furniture; another by an exhibit of feminine dress for outdoor sports, etc., and in the annex were exhibited stationary gas engines of the usual design—not on automobile lines. These efforts of the organizers to make the Salon a popular event and secure large attendance were certainly successful, as a continuous stream of visitors passed through the entrances every morning from shortly after the opening hour, and around the noon hour and in the evening the main hall was always packed, and the aisles virtually blocked. At such times it was evident that a large proportion of the visitors had come chiefly to be entertained—to enjoy the decorations, the illumination and the band concert—the great throng moving slowly through the aisles and paying comparatively little attention to the cars exhibited.

While it may be advantageous from the standpoint of the management of an automobile show to have as large an attendance as possible, the case is not so clear when the interests of the exhibitors are considered. The large throngs of sightseers certainly interfere to an extent with the transaction of business, and render im-

possible the general distribution of comprehensive and instructive catalogues.

The Paris Show will undoubtedly continue to lead in magnitude, in wealth of decorations and in attendance. The conditions which affect the successful holding of automobile shows are different in Paris from those that obtain here, and we believe it would be a mistake in this country to undertake to develop automobile shows along the same line as the Paris Salon. It would be a mistake to admit to the Show exhibits foreign to the automobile field, or to invite the attendance of people without legitimate interest in automobiles, as, for instance, by reducing the admission price and providing gaudy decorations, music, etc. The best interests of the trade will be served if shows are developed strictly as trade events and not given the character of popular entertainments.

Gasoline Consumption in the Glidden Contest.

Although not yet formally announced, it is understood that the conditions which have been drawn up by the committee in charge of the competition for the Glidden touring trophy will require, among other things, that the amount of gasoline consumed by each car be reckoned with in determining the winner of the contest. In order to place all cars on an equal basis it has been deemed best to deal in the final score only with the amount of fuel used per ton mile, the idea being to determine the relative efficiency of the motors and transmission systems of the various cars, regardless of their weight, and to place the heavy cars on an equal competitive footing with the lighter ones.

From one point of view this provision is good. Given two cars of approximately equal weight, the relative efficiency of their motive power equipments could be determined by this method with a fair degree of accuracy. From another point of view, however, it would seem that it completely missed the mark and failed to recognize the real aim in motor car design. By this method no consideration is had of weight of the car with respect to the work it must perform, and a car weighing empty 3,000 pounds and carrying two passengers has an equal chance to win the cup with one which weighs 1,600 pounds and carries four; assuming, of course, that all other factors are equal.

The weight of the car itself is a most important consideration in motor car design, and at this late day it would be a mistake not to recognize the fact in the conditions for what is ostensibly to be an international touring competition. Excessive weight is largely responsible for tire troubles, and here again we see a tendency to favor the very heavy cars by the non-penalization of stops for tire repairs. In a majority of the larger cars the added weight is necessitated largely by great speed capabilities, and an equal durability could be obtained with less weight if this speed were reduced; and while it is not desirable to secure increased durability at a sacrifice of rational speed, it is true that a large part of the weight of the high powered cars is due to speed capabilities far in excess of the requirements for touring purposes.

If gasoline consumption tests are to be of any value they must furnish information on the relation of fuel consumption to results accomplished. Neither the designer nor user is interested in how much it costs to operate a pleasure car per ton mile, but rather in the actual cost of operation, with respect to the useful work done, which can be determined only on a basis of passenger miles.

Alcohol Solution as a Non-Freezing Liquid.

A correspondent calls our attention to the adaptability of a solution of wood alcohol in water as a non-freezing cooling liquid for gasoline engines, and also for use in acetylene generators. He enumerates the disadvantages of other non-freezing cooling fluids, such as calcium chloride solution, glycerine solution and light mineral oil, and claims that the alcohol solution has none of these, and, in fact, is absolutely free from objectionable features when used for these purposes. It does not attack either metal or rubber, does not produce an offensive smell, circulates more freely even than pure water, and does not freeze at ordinary winter temperatures when maintained at the proper density. A 25 per cent. solution is recommended for ordinary conditions and a 30 per cent. solution in extremely cold weather.

We cannot agree with our correspondent that the alcohol solution is an ideal cooling fluid in all respects. The most important objection to its use is that owing to the great volatility of the alcohol it is difficult to keep the density of the solution constant, and it is necessary to frequently adjust it by the addition of fresh alcohol. While with most of the other solutions nothing evaporates but water, which can be replenished without expense, where an alcohol solution is used by far the greater part of the loss by evaporation is alcohol, a comparatively expensive liquid. The actual importance of this objection depends largely upon the cooling facilities of the car. If much low gear work is done, and the radiator is comparatively small, so that the cooling fluid frequently reaches a temperature near the boiling point, the rapid evaporation of the alcohol may lead to a considerable expense; but if the cooling system is such that the cooling fluid only reaches a comparatively low temperature the loss by evaporation may not be a matter of great moment.

Another possible objection to the use of an alcohol solution is the inflammable nature of the vapors given off. The same objection applies to the use of oil for cooling purposes. Considerations of safety would seem to forbid the use of a combustible liquid in the cooling system of an explosion motor, especially as there must always be some overflow and loss by evaporation from the system. Mineral oil is, of course, not very inflammable, but some recent correspondence in our columns has shown that its use for this purpose involves fire risks. The alcohol solution above recommended is not inflammable, but the vapor given off when such a solution is heated may be so rich in alcohol that it will readily ignite when mixed with air in the right proportion.

All the different non-freezing cooling fluids which have been experimented with so far are open to one objection or another, and which is the best in any particular case depends upon the cooling system of the car and the minimum temperature that must be guarded against. The novice, or the experienced user who has not yet found a satisfactory non-freezing liquid, will therefore be well advised to try the different available fluids in succession, noting carefully the results with each and then making a comparison.

As a liquid for acetylene generators the objections to alcohol solution above mentioned practically vanish, because the liquid in the generator remains at atmospheric temperature, except when the lamp is burning, and the evaporation is therefore slight. Consequently the solution is very well suited to this use.

The Paris Show.

General Report.

By P. M. Heldt.

The leading manufacturers, as a rule, had made very few important changes in the models which they continued from last year, and the new models to be seen at the different stands were almost without exception of high horse power (35 to 50). It is very evident from this that the so called "great manufacturers" in France have little desire to cater to the demand for a popular priced car, there being only comparatively few among the well known firms who give any attention to runabout cars with single or double cylinder engine. Right here we have one of the most prominent distinctions between the automobile industry of France and that of America—that in France the manufacturers building the most expensive type of cars are regarded as the leading manufacturers, while in America the firms producing moderate priced machines and working on a large scale are generally referred to as the leaders. There are, of course, plenty of comparatively unknown firms who occupy themselves with the construction of voiturettes, the equivalent of the American runabout, although of essentially different design. The frame of these lightly built vehicles is usually tubular, the engine a single cylinder vertical upright in front, the change speed gear of the sliding pinion type, and the drive by shaft and bevel gear. Such typical American creations as double opposed horizontal motors, planetary change speed gears, single chain drive and detachable tonneau bodies are not produced by any of the French manufacturers.

That a considerable number of leading manufacturers brought out new high powered models can hardly be regarded as a sign that there is a great demand for such cars. If they had produced novelties of the opposite type, that is, small vehicles of low horse power, they would have had to meet the competition of the many small provincial machine shops which in late years have taken up the construction of voiturettes on an assembling plan, the motors being furnished by such houses as De Dion, Buchet, Minerva, Abeille, etc. All competition from this source is avoided in the field of heavy, powerful and luxurious vehicles, which can only be successfully manufactured by manufacturers of considerable financial resources and engineering ability.

In line with the above remarks it is of interest to observe that again a number of the most prominent engineering firms in France have entered the automobile industry, and at the Show for the first time presented their productions in this line to the public. We will here only mention the firms of Delaunay-Bellville and Westinghouse. The first mentioned is prominent as a manufacturer of stationary steam engines and other heavy engineering work, while the French Westinghouse Company in Havre is one of the most prominent electrical manufacturing concerns in that country. Both firms exhibited several types of medium powered four cylinder touring cars, and from their achievements in other lines of engineering it may be expected that they will soon rank among the leading automobile manufacturers of France.

The frames of the larger cars exhibited were almost without exception of pressed steel, as first adopted in the construction of the Mercedes vehicles and further developed by the Douay Iron Works, who manufacture the famous Arbel pressed steel frames used on the majority of the leading French makes of cars. For light cars tubular frames continue to be used to a certain extent, and now and again one meets with a car with armored wood frame, which type of construction is still adhered to by its originators, Panhard-Levassor, except in the construction of their most powerful car. Charron, Girardot & Voigt also retain their original frame construction of square tubes filled with wood. One car was noticed which had a frame of channel steel with the open side turned inward, and a sheet steel plate on edge, with variable height over the opening of the channel steel, the latter being filled with wood at the places where bolts join the two parts of the frame beam. The latter construction offers at least some of the advantages of the pressed steel frame, and is better adapted to "home manufacture." While there is comparatively little variety in the construction of the main frame members, widely different methods were followed in cross bracing the side members and in supporting the engine and gear box on the frame. A few frames were noticed, which were entirely in one piece, without riveted joints, similar to the chassis shown last winter at the different American shows by a New York importing firm, and heralded as a masterpiece of metal working; but in general the side members were joined by cross members of either pressed steel or tubular form with riveted joints. Practice proved to be quite divided regarding the manner of supporting the engine and gear box, frames without false frames or cradles for supporting these parts being about as numerous as those with. Where false frames are used they are either of pressed steel, channel iron or tubular construction. The tubular sub-frame possesses the objectionable feature that it is difficult to secure to it the parts which it has to support, but offers the advantage of lightness. One of the most prominent makes of cars in which this form of sub-frame is used is the Richard-Brasier.

When the engine and gear box are supported on sub-frames the feet cast on them usually rest directly upon these frames, and are secured to them by bolts and dowels. When it is desired to remove a part so supported, it is only necessary to take out the bolts and lift it off the frame. When the parts are supported directly on the main frame members it is impossible to let the feet of the cases rest on top of the members, and rather impracticable to have them extend into the open side of the pressed steel beam, as in that case one frame member would have to be entirely removed before the engine or gear box could be taken off. It is then usual to fill the side members of the frame at the points where brackets on the engine and gear cases fasten to it, or to interpose small brackets between the feet of the cases and the frame members, resulting in a plain horizontal joint, to make a more ready removal of the supported parts possible. A rather original method of supporting the engine on the main frame members was seen on one car. The feet, cast onto the engine crank case, were curved outward and upward, and their ends bored out perpendicular to the plane through the engine cylinders, to receive tubes extending across the frame, the ends of which were secured on top of the main frame members by suitable brackets. It is now a very general practice to narrow the frame in front so that the car may be turned in a reasonably short radius in spite of the exceptionally long wheel base, necessitated by side entrance tonneau bodies; also to swing the rear springs out from underneath the frame members, in order to reduce the sagging strain on the rear axle and increase the stability of the car. Spring damping or shock absorbing devices, such as the Trouffault device, used on the Richard-Brasier Gordon Bennett racer, pneumatic cushions, etc., were shown on many of the more powerful vehicles exhibited. Semi-elliptic springs remain the prevailing practice, in spite of some advance in the adoption of platform springs, but the springs are in many instances made longer and wider, and in at least two of the big, closed touring cars rear springs of 56 inch length were employed, longer probably than have ever before been used on motor vehicles.

It appeared that the greater part of the designers' ingenuity during the past year have been expended on improvements on engines, these seeming to present the greatest number of little changes in design. An improvement made by a number of the leading firms consists in enclosing the entire cam shafts, cams and cam gears within the engine housing, thus protecting all these working parts against road dust and moisture, and reducing their noise and their necessary weight. Attention may here be called to the fact that this practice is already common in America, and exposed gears would probably have been generally regarded as very bad construction, had it not been the fact that such leading manufacturers as those of the Mercedes and Panhard cars persisted in their use. Panhard and Mors now have their gears enclosed, while Mercedes and

RADIA.

WESTINGHOUSE.

DUCORMEN.

DE DIETRICH.
TYPICAL OPEN VEHICLES.

C. G. & V. continue to place the gears outside the crank chamber. Where exposed gears are used they are always either entirely of fibre or rawhide, or of fibre discs alternating with metals discs, in order to reduce the noise of their operation. It is needless to say that where this construction is employed a comparatively large width of face of the gears is the rule.

In the matter of individual cylinder versus twin cylinder construction practice is divided about evenly. The former method offers the advantage of less expensive renewal in case of damage to one cylinder, while the former is advantageous for the reason that it gives a more compact engine and is slightly less expensive to construct. One point in this connection which was rather surprising to the writer is that quite a number of French manufacturers using individual cylinders seem to have made no effort to place these as close to one another as possible to secure a compact construction. In one American engine of this type, for instance, the water jackets of the cylinders are flattened at the points where the jackets are nearest to each other, so as to bring the cylinder diameters as close together as possible. In the new four cylinder De Dion engine, on the other hand, the separate cylinders are a considerable distance apart, and in one other four cylinder engine the exhaust pipes from the exhaust valve chamber were led through between adjacent cylinders, thus making an engine of abnormal length. The prevailing form of valve chamber and valve gear arrangement was that first introduced by the Mercedes a number of years ago; that is to say, the cylinders are cast with inlet and exhaust valve chambers on opposite sides, and the two sets of valves are mechanically operated from separate cam shafts. The more recent Mercedes construction, consisting of placing the inlet valves directly in the cylinder heads and operating them through push rods and tappets, seems to have met with less favor among the manufacturers who take their cues from the recognized leaders in automobile design.

The driving of such appurtenances as the ignition generator, circulation pump and mechanical oil pump is now generally effected by means of spur gears, and as these parts are usually driven at a rotative speed considerably above that of the cam shaft, they are geared up from these shafts by means of small gear wheels meshing with the cam shaft gears. Usually one of these accessories is driven from the exhaust valve cam shaft, and one from the inlet valve cam shaft, although in some instances both are arranged at the same side of the engine and driven through the same gears, and consequently at the same speed. The majority of these engines are therefore provided with five gear wheels, and some even have six.

The expression "improved carburetor" was

used quite frequently by the attendants on the stands, but none seemed to know just what the improvements consisted in. As a matter of fact, in most such instances the firm had only recently changed to the automatic carburetor with suction operated supplementary air inlet, or with interconnected mixture and air valves, and it would have been an admission of backwardness had the improvement been explained in detail. One of the most notable tendencies in touring car design is represented by the general adoption of pressure fuel feed, a feature which only a year ago was peculiar to the Mercedes system. At the Paris Show there were at least a score of makes in which the fuel is fed from the supply tank to the carburetor by gas pressure derived from the exhaust, and on one car at least attempts had been made to improve this method of feed by obviating the necessity of pumping up pressure in the tank by hand when about to start the motor. This end is accomplished by placing an auxiliary tank holding about a half a gallon on the dashboard. When it is desired to start the motor a valve is opened by which the auxiliary tank is placed in communication with the carburetor float chamber, and as soon as the motor has run up to speed, and the main tank is put under pressure from the exhaust, the auxiliary tank is shut off. In this manner the auxiliary tank needs to be filled only at long intervals. The main tank is always placed low, under the frame at the rear, and is of oval section, as in the Mercedes cars.

Lubrication in the four cylinder cars is always by some form of mechanical or pressure oiler. Three types of these oilers are in general use—the one in which each feed is supplied by a separate piston pump, the gas pressure sight feed and the type in which one pump of the gear type supplies all the feeds, which are connected in parallel. The latter type of oiler, which has the advantage of simplicity, seems to be used most extensively. It is not free from theoretical objections, as when a feed pipe becomes choked the feed through it will cease, but, then, the driver has all the sight feeds right in front of him on the dash, and has therefore a constant indication of the rate of feed to each bearing, etc. If any feed should cease or fall below the desired rate he can adjust the needle valve provided for the purpose, or, if necessary, clean the feed tube. With this oiling system only the sight feeds are placed on the rear of the dashboard, and these are located as high as possible to obtain the greatest possible head on the bearings.

In regard to cooling systems, it was noticed that cellular radiators are used most extensively on the heavier and more powerful cars, while flanged tube radiators are used most generally on the lighter cars. Thus the Panhard firm, for instance, continues to provide all its older models with flanged tube radiators, but fits its new 50 horse power model with a cellular radiator.

ISOTTA & FRASHINI.

VINOT & DEGUINGAND.

MORS.

TYPICAL CLOSED VEHICLES.

Cellular radiators were also seen on a number of the motor trucks exhibited in the annex to the Show. While it is true that a greater radiating capacity is required for a given size motor with a slow moving truck than with a fast pleasure vehicle, and that the cellular type of radiator has a greater radiating capacity for equal weight and volume, it is doubtful whether this type of radiator is sufficiently robust to make its use advisable on a heavy machine fitted with solid, or even iron, tires. The great majority of cellular radiators, and the corresponding bonnets, are of the Mercedes form of outline, which has sometimes been described as "coffin shaped," but a number of the new vehicles shown were provided with radiators of circular or part circular form, and with a correspondingly shaped bonnet. Thus the radiators on the cars of the Neue Automobil Gesellschaft and of Delaunay-Bellville are circular in form, while the radiator on the Hotchkiss car has an outline resembling a circle with a portion cut away below.

Fans for increasing the air circulation through the radiator are used on all of the heavier cars. In some cases two fans are used, one mounted on a stud directly back of the radiator, and one formed by the flywheel spokes of the engine, while in others the flywheel fan alone is depended upon to create the necessary air draft. The latter method is, of course, only effective when the engine is completely enclosed by an apron underneath the frame. Where this method is employed, the flywheel is frequently made of steel and of unusually large diameter for a four cylinder engine. When a conical clutch is employed the arms or spokes of the clutch cone are sometimes also made of fan blade form, the same as the flywheel spokes.

On American cars the radiator fan is usually driven through a coiled spring belt, which is self adjusting and automatically maintains a constant tension. While this method of driving was also noticed on a few cars at the Paris Show, in the large majority of cases the drive was effected by means of a plain flat leather belt, which, as well known, is subject to atmospheric influences, and will stretch and refuse to drive. In a number of the cars exhibited provisions had therefore been made to either cause the stretching to be taken up automatically, or to allow it to be taken up by varying the position of the stud on which the fan revolves. In the De Dietrich cars the stud on which the fan revolves is mounted at the end of the short horizontal arm of a bell crank pivoted to the forward end of the engine, and the long downwardly extending arm of the bell crank is drawn by a coiled spring in such a direction as to tend to increase the distance between the two belt pulleys. The tension of the belt is therefore always the same. In the Rochet-Schneider car the fan rotates on a stud, which is clamped in a slot in a bracket on the engine, so that when it desired to tighten the belt it is only necessary to loosen the nut by which the stud is clamped, move the fan stud outward away from the stationary pulley as far as the belt will allow, and then tighten the nut again. In this machine, as well as in several others at the Show, the fan is driven from the forward end of one of the cam shafts instead of from the crank shaft, as is the more usual practice.

The most important novel tendencies were observable in methods of ignition; these will be dealt with in a special article.

In clutches there is a marked tendency away from the conical, leather faced clutch, especially in the larger cars. The leather faced clutch has an unpleasant tendency to take hold suddenly and cause the car to start off with a jerk, which is the more disagreeable to the passengers and the more injurious to the transmission mechanism the more powerful the motor. The new clutches are either of the multiple disc or of the expanding ring or segment type, and generally only about one-quarter the diameter of the flywheel, so that they do not interfere with the fan action of the flywheel spokes. Most of these clutches are entirely enclosed, and it was impossible to obtain a good idea of their construction from the chassis exhibited, but we expect to be able to give illustrations and descriptions of the more important novelties in this line at a later period. These metal to metal clutches, whether of the disc or expanding type, are always hermetically enclosed and work in oil; and for some of these clutches it is claimed that no injury will be done to them if they are allowed to slip for considerable periods, and that they will never grip violently or with a jerk.

The use of universal joints between the clutch shaft and the change speed gear and in the differential shaft does not seem to be as general among French manufacturers as it is in this country. In the Richard-Brasier cars a triple joint, consisting of two universals of the familar cross type and a square sliding joint, is interposed between the clutch and the change gear box. This arrangement provides for all possible changes of relative positions, but it would seem that the same object may be accomplished equally well with a single Oldham coupling, which can be made at not more than one-quarter the expense.

In change speed gears, the type of gear, with a double or triple set of sliding pinions, is in the ascendency. The practice of using multiple sliding sets was formerly confined to Mercedes cars, and thus another Mercedes feature is being widely copied by French manufacturers. In this type of gears, when the gear shifting lever is in operative relation with one sliding set, the other sliding set must be locked in position in some manner. This locking operation is accomplished in the Mercedes gear by the transverse motion of the gear shifting lever, and is absolutely positive. The following slightly simpler and undoubtedly equally effective arrangement was seen on a number of cars at the Show: The different sliding sets are controlled by sliding bars extending through the wall of the gear case at both ends; the rear ends of these sliding bars are cut with V notches, into which is adapted to engage a spring pressed plunger, with wedge shaped end. The V notches in the sliding bars are so arranged that when the wedge shaped end of the spring pressed plunger rests in them the sliding sets are located in the different working or idle positions; that is to say, the transmission gears are either in full mesh or entirely out of mesh; the sliding bars are also provided each with a notch at their forward end, into which is adapted to engage the lower end of a downwardly extending lever arm on a hollow shaft, which also carries the gear shifting lever. When the gear shifting lever is in the middle position the notches at the forward end of the two or three sliding bars are in line with each other, and the downwardly extending lever arm can be slid into the notch on any one of these sliding bars by simply moving the shifting lever in a transverse direction. The shifting lever moves, of course, on a gridiron quadrant.

Some very ingenious methods of picking up and dropping the different sliding sets were seen. In one car these operations are performed by means of a small lever at the upper end of the gear shifting lever, arranged similar to the latch lever.

The shafts of the change speed gears in practically all the large cars are mounted on ball bearings, generally of the D. W. F. type (Deutsche Waffen Fabrik-German Arms Factory). These consist of an internal and an external hardened steel collar, the internal collar being turned with a groove for the balls on its outside surface, and the external collar with a similar groove on its inside surface. The balls are placed between these two collars, being introduced into the grooves through suitably shaped passages. The balls are held apart by means of short lengths of coiled spring, which are filled with cotton waste containing lubricant and buffer plates of sheet metal at each end against which the balls roll. This type of ball bearing is, of course, non-adjustable. The same ball bearings are used on the Hotchkiss, Mercedes and a number of other crank shafts, and a four cylinder crank shaft adapted for being mounted on such bearings was shown at the stand of Glaenzer Frères, who are the representatives in France for the manufacturers of these bearings. The main journals of this crank shaft were made of large diameter and hollow, so as to give a great bearing surface.

Transmission by chain and by shaft and bevel gears are almost equally in vogue, but shaft transmission is naturally used more generally in the lighter type of cars. The advocates of chain transmission often raise

the objection against shaft drive that it is too inelastic and does not absorb road shocks to the same extent as does the chain. In order to overcome this objection, a number of manufacturers of shaft driven vehicles interpose an elastic member in the drive shaft. This consists either of a very strong coiled spring around the rear end of the drive shaft, the forward end of which passes through a hole through the drive shaft and the rear end over a pin fastened into the hub of the driving pinion, the driving pinion being mounted loose on the end of the shaft; or of a number of coiled springs interposed between the arms of a spider on the drive shaft and the arms of another spider on the pinion.

As regards brakes, the rear hub brakes are now frequently of the internal expanding type, and entirely enclosed, as in the Mercedes cars, instead of the formerly more common band brakes. Internal expanding brakes are also used to some extent on the transmission, as, for instance, in the new Renault models. The great majority of cars are provided with the usual two independent braking systems, the foot brake acting on one of the gear shafts or on the propeller shaft, and the hand emergency brake acting on the rear hubs. In a number of the larger cars, however, three independent brakes are provided—one on one of the change gear shafts, one on the countershaft and one on the rear wheel hub. Where three brakes are used only one of the transmission brakes is interconnected with the clutch, so that it is possible to apply the other brake without disconnecting the engine, which is a great advantage in descending long, steep hills. The brake on the transmission shaft is located with about equal frequency directly back of the change gear box and directly in front of the driving gear box. A novelty in the line of brakes was the pneumatic brake acting on all four wheels, which was exhibited on one of the Mercedes cars at the Show, and which will be described in our next issue.

Dust aprons of sheet metal are now almost universally provided on all the larger cars. They often make a tight joint with the frame in front, and also with the cross member of the frame directly back of the gear box, or they extend back even farther than this. An apron of this kind may not add to the appearance of the vehicle, especially if the machinery is located unusually low, but it certainly serves a practical purpose, and ought to increase the life of the mechanism considerably.

As in previous years, statistics regarding the exhibited vehicles and motors were compiled on the opening day by *L'Auto*, the official organ of the Automobile Club of France. These statistics are most interesting, as they are really the only means of judging the trend of design with absolute certainty. The figures of *L'Auto*, pertaining to the exhibits of the 121 French and foreign automobile manufacturers exhibiting, are reproduced herewith:

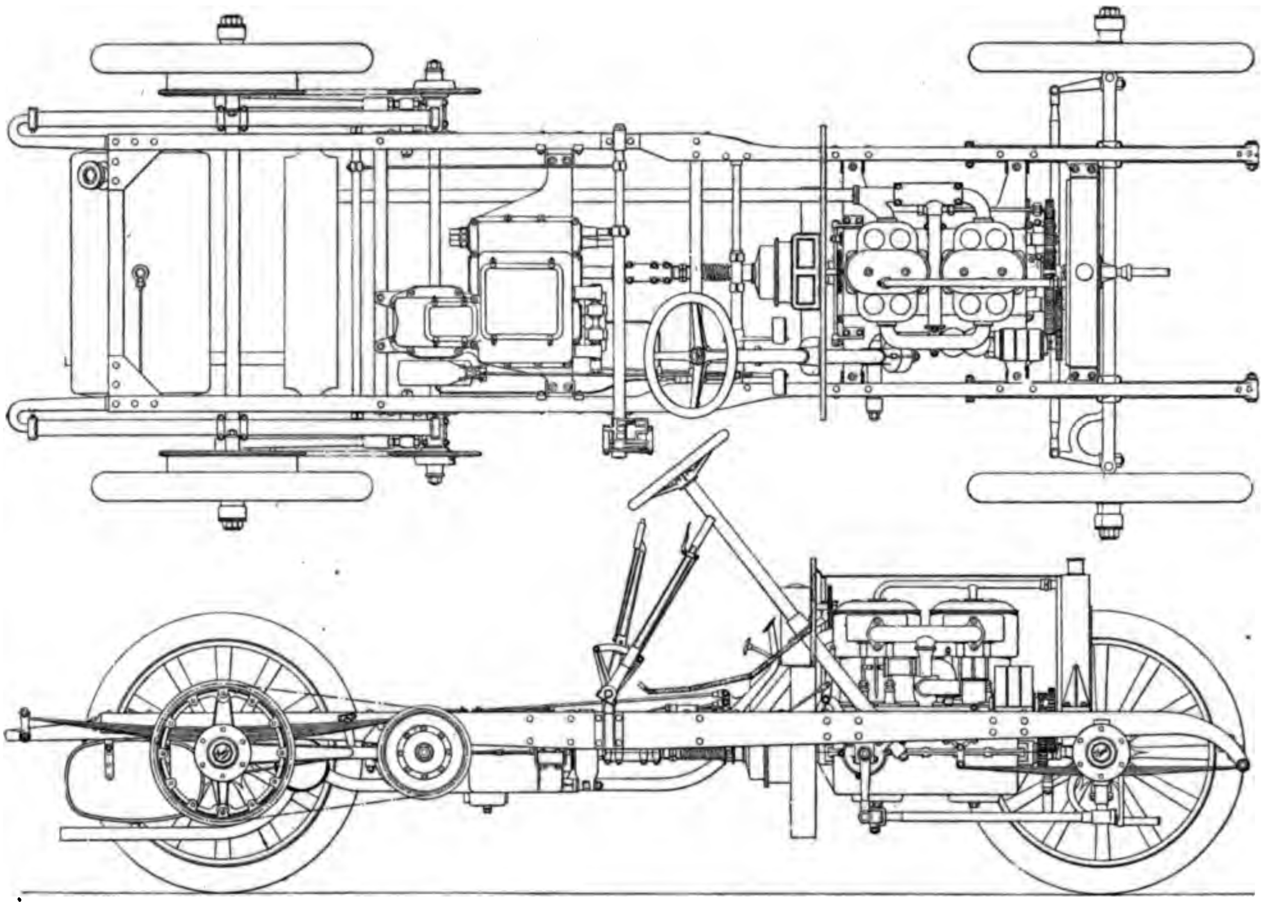
	Per Cent.
POWER OF MOTORS.	
Up to 8 horse power	7
From 8 to 20 horse power	37
Over 20 horse power	56
NUMBER OF CYLINDERS.	
Single cylinder	9
Two cylinder	6
Three cylinder	8
Four cylinder	72
More than four cylinders	5
MOTOR CONTROL.	
On admission	96
On exhaust	4
IGNITION.	
Battery or accumulator	16
Low tension magneto	44
High tension magneto	36
Miscellaneous	4
FRAMES.	
Pressed steel	70
Armored wood	12
Tubular	14
Section steel	4
CLUTCHES.	
Forward tapering cone	42
Inverted cone	36
Metal to metal	20
Miscellaneous	2
CHANGE GEARS.	
Sliding gears	88
Miscellaneous	12
TRANSMISSION.	
By chains	48
By shaft	51
By belt	1
RADIATORS.	
Cellular	31
Flanged tube	69
INLET VALVES.	
Automatic	27
Mechanical	73
REAR SPRINGS.	
Swung outside frame	70
Directly under frame bar	30
REAR HUB BRAKES.	
External	28
Internal	72

Exhibits of Commercial Vehicles.

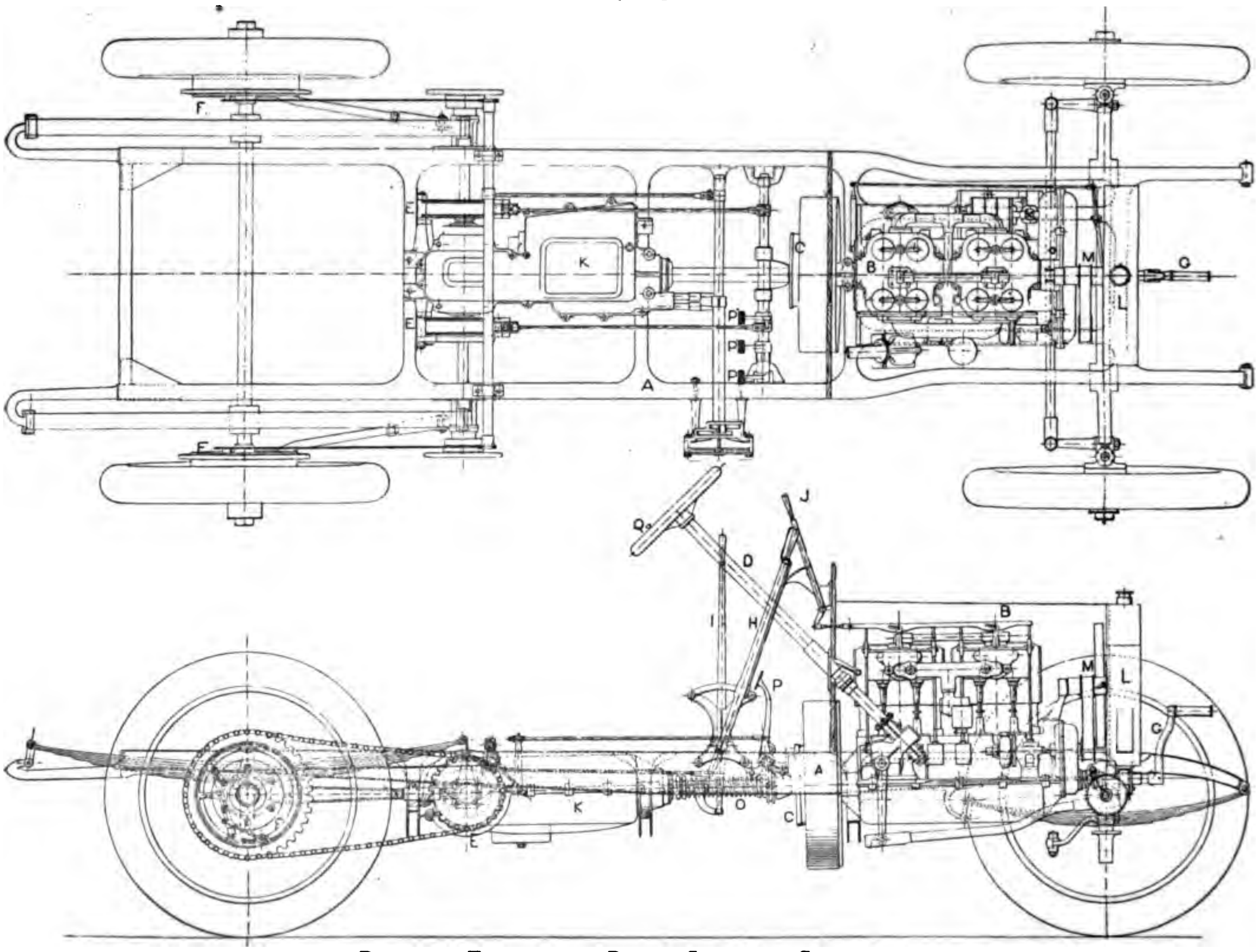
Several classes of exhibits were this year installed in a building known as the "Serres de la Ville de Paris," a sort of conservatory located about five minutes' walk from the Grand Palais. The exhibits in this building, the space in which was all taken, consisted of commercial motor vehicles, stationary gas engines, motor boats and machine tools adapted for the construction of automobiles. Readers of THE HORSELESS AGE will be most interested in the commercial motor vehicles —delivery wagons, trucks and omnibuses. Of these about fifty were shown, indicating that French manufacturers are devoting much greater attention to the commercial vehicle problem than ever before. Heretofore the commercial motor vehicle has made little progress in France, in spite of much encouragement from the national automobile club. It seems to be a general principle that as long as the automobile industry of a country is fairly occupied supplying the demand for pleasure vehicles, the commercial car is neglected, because the former offers greater immediate returns on investments. That so many commercial vehicles were exhibited at the Salon is not to be taken as a sign that great progress has been made in France in the construction of commercial cars, nor that the business men of France have become fully alive to the economical advantages of motor haulage, but simply that the manufacturers believe the time has come when they can advantageously add trucks, delivery wagons and omnibuses to their line.

All three motive powers were represented among the exhibits of commercial wagons, electricity and steam on only one or two stands each, however. Most of the gasoline trucks and omnibuses were shown by prominent manufacturers of pleasure vehicles, including the firms of Panhard, Peugeot, Decauville, De Dion, Delahaye, Delaugere, etc. The trucks and heavy delivery wagons of all these firms are very much alike in general arrangement. The motor is always vertical and located in front, its power being transmitted through a sliding pinion change speed gear, giving either three or four forward speeds and a reverse, and through double side chains to the rear wheels. The chassis is either of channel steel or armored wood. A few particulars of some of the wagons exhibited may be of interest.

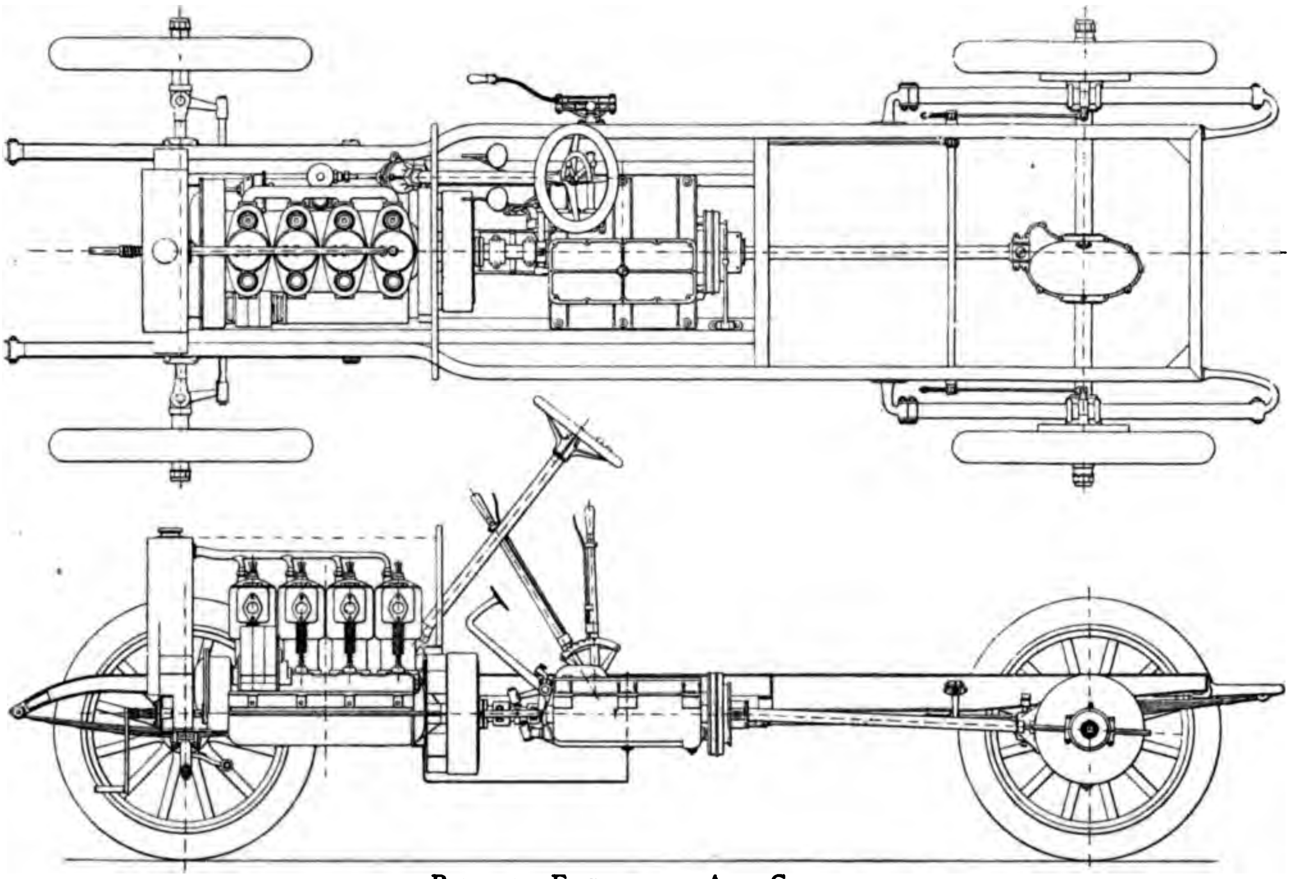
The Neue Automobil Gesellschaft, of Berlin, Germany, exhibited a 3 ton truck, fitted with a two cylinder vertical 16-18 horse power motor in front under a bonnet. The driver's seat and the control mechanism are directly back of the motor. It being a motor of only two cylinders, and the space between dash and seat being restricted as much as possible, the length of the frame taken up by motor and seat is not very great. The frame is of channel steel, and is supported on semi-elliptic springs at both ends. The truck platform is raised about a foot above the frame and extends over the rear wheels on both sides to obtain the necessary loading space. The change speed gear is of the sliding pinion type, and the drive to the rear wheels by side chains. Steering is effected by means of a hand wheel on a vertical column, through a worm and worm wheel sector. The front axle ends on this and all other heavy vehicles exhibited are forked, this construction being claimed to give greater strength than the so called Panhard steering head. The axles, springs and wheels were, of course, of very heavy construction, considering the power of the motor. The total weight



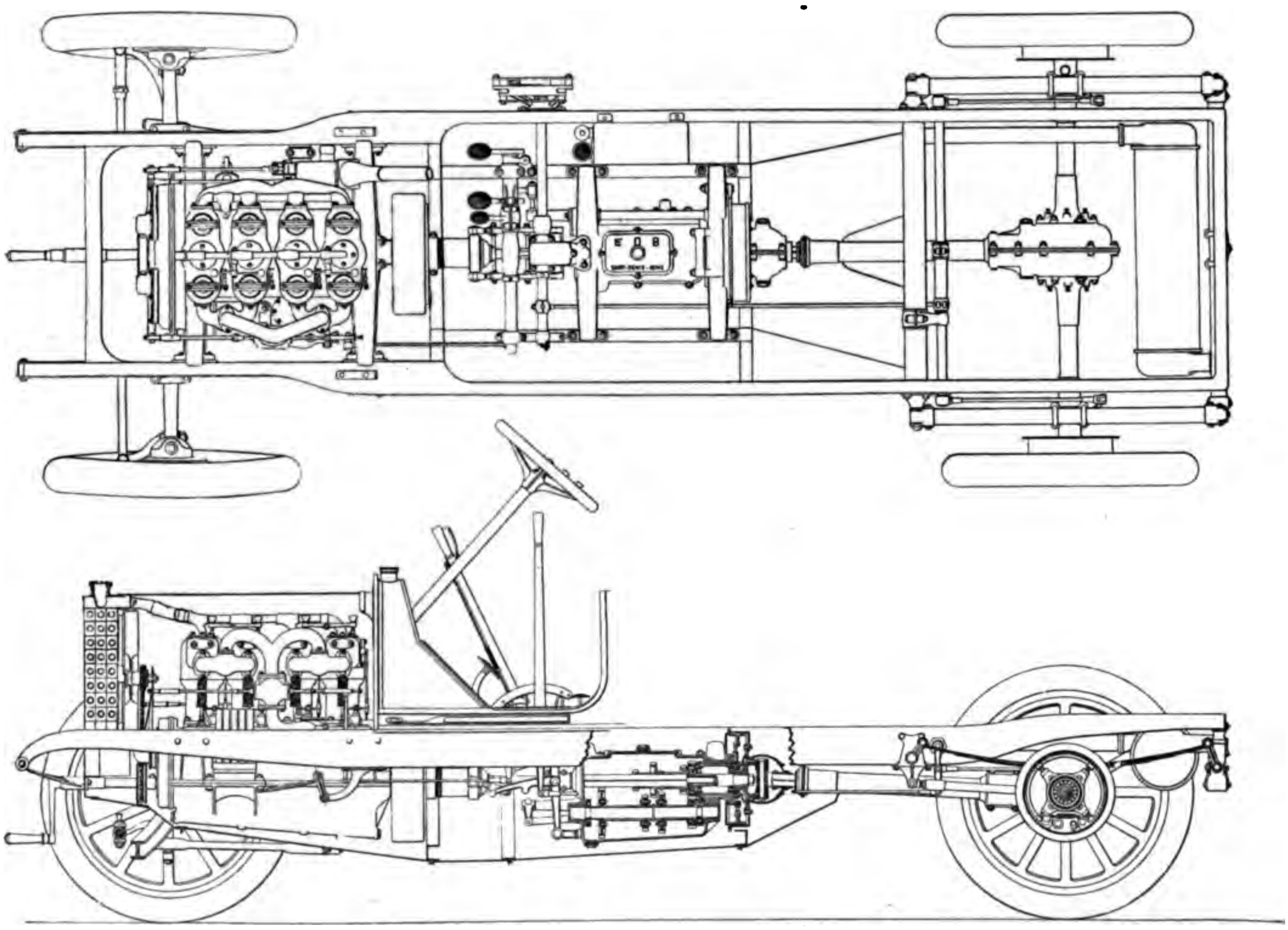
Plan and Elevation of 24 to 32 H. P. Fiat Chassis.



Plan and Elevation of Rochet-Schneider Chassis.



PLAN AND ELEVATION OF ADER CHASSIS.



PLAN AND ELEVATION OF 16 TO 20 H. P. DELAUNAY-BELLEVILLE CHASSIS.

of the truck exhibited was stated to be about 6,000 pounds. The wheels had ordinary steel tires.

The same firm also exhibited a delivery wagon of 1,600 pounds loading capacity, and fitted with a 6-9 horse power two cylinder vertical motor. The arrangement of the mechanism is the same as in the truck, but the delivery wagon runs on solid rubber tires instead of the plain steel tires. It may be added that both machines are fitted with the N. A. G. tubular radiator of circular form.

The Olds Motor Works also had a stand in the "Serres," where they exhibited one of their railway inspection cars, one 10 horse power delivery wagon, one runabout, one tonneau and one new type of delivery wagon, with pressed steel frame platform springs and other features new in Oldsmobile practice. Owing to the fact that the only attendant at this stand was busy with customers every time I passed, I am unable to give further particulars of this machine.

Panhard et Levassor had three commercial wagons at their stand, viz., an 8 horse power three cylinder light delivery wagon, with 5 inch pneumatic tires; a 10 horse power four cylinder army wagon, fittted out with a complete equipment for X-ray photography and wireless telegraphy, which took part in the French manœuvres last fall, and a 10 horse power heavy delivery wagon of 2 tons capacity, with solid rubber tires. I was told by the attendant that an order for six of the latter had only recently been placed by a large Paris firm. The engines and change gear boxes on these wagons are the same as those used on Panhard pleasure vehicles, but the frames (armored wood), the springs, axles and wheels are naturally much heavier than any used on pleasure cars. The radiators are also larger than those used with the same size of engines on pleasure vehicles, to compensate for the reduced natural cooling effect at the slower speeds. On the army wagon the box serves for dark room purposes. The upper part of the boxes on all the vehicles overhangs the rear wheels. The attendant at the stand expected for the last week of the Show a 10 horse power truck, which in many respects is the same as the 10 horse power delivery wagon, except that it has a much longer frame. The truck, which is in use at the Panhard Works, is fitted with 5 inch pneumatic tires, and the attendant stated that his firm advocated the use of pneumatic tires on commercial vehicles generally, but customers frequently specified solid tires; pneumatic tires insure better protection of the motor and other mechanism against road shocks.

At the next stand was shown a Cottereau three cylinder 12 to 14 horse power truck, with steel tires in the rear and solid rubber in front. The engine is placed under the driver's seat, and the platform is raised about 6 inches above the running gear frame and extends over the driving wheels on each side. The frame is of channel steel and is supported by semi-elliptic springs at both ends. The rear springs have no rigid connection with the frame, the spring bolts sliding in slots in the frame bars, and the rear axle being held in position solely by the distance rods.

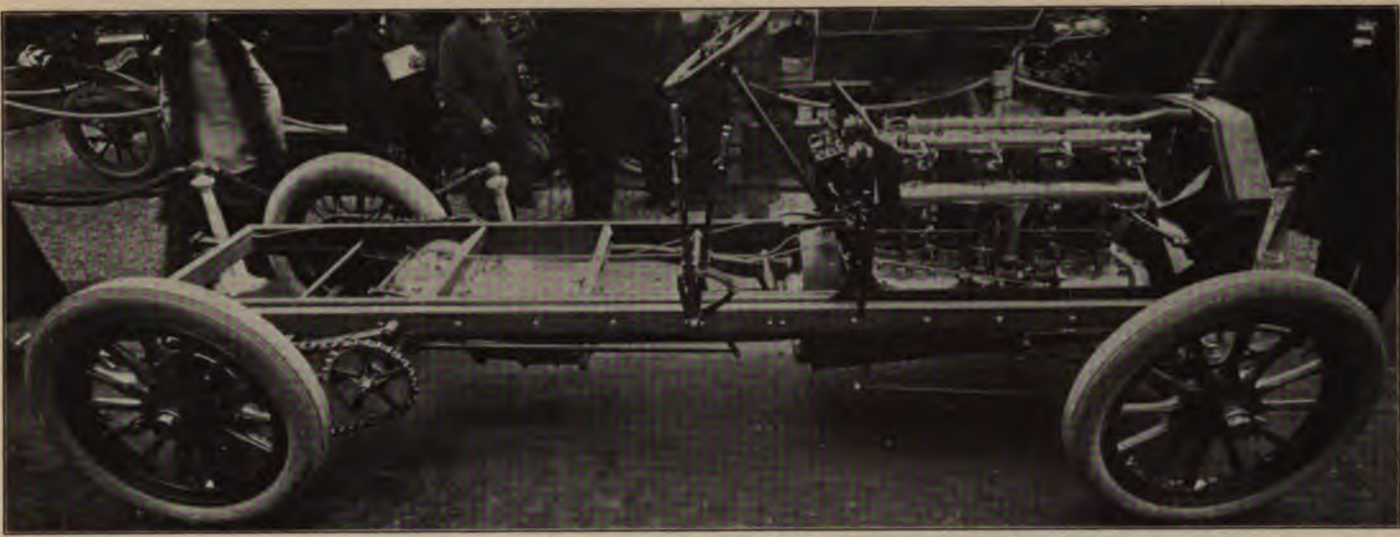
The Decauville firm exhibited three vehicles on its stand—a 3 ton truck, a one ton delivery wagon and a fifteen passenger railway motor car, said to be sufficiently powerful to draw a trailer carrying another fifteen passengers. The truck is fitted with a 12 to 16 horse power motor under the seat. The radiator is arranged on top of the driver's cab, where it certainly does get the full benefit of the cooling draughts stirred up by the motion of the vehicle. The wheel base of the truck is extremely long (152 inches). The engine drives through a three speed change gear and side chains to the rear wheels. The three speeds are given as 2½, 5 and 11 miles per hour, respectively. The weight of the truck unloaded is about 2 tons. The frame is of what the firm is pleased to call "armored" construction, that is, the under portions of the crank and gear cases are cast in one piece and are joined to the frame by plates of sheet metal. The truck has steel tires. The one ton delivery wagon has almost exactly the same running gear as the 12 to 16 horse power touring car, except that the change gear gives only three forward speeds and the car is geared somewhat lower (to give 5, 10 and 20 miles per hour, respectively).

Adolph Saurer, of Arbon, Switzerland, exhibited a 5 ton truck with four cylinder 25 to 30 horse power motor. The truck shown had solid rubber tires, but in a circular issued by the company it is shown fitted with plain steel tires in front and "barred" steel tires in the rear. The general arrangement of the truck is exactly the same as in the trucks already described. A disadvantageous feature is that the long motor and the driver's seat occupy nearly one-half of the total length of the frame, and the available loading space is entirely inadequate for a load of 5 tons of ordinary merchandise. The truck has a cellular radiator and Simms-Bosch high tension magneto ignition. The engine is of comparatively simple design and well enclosed.

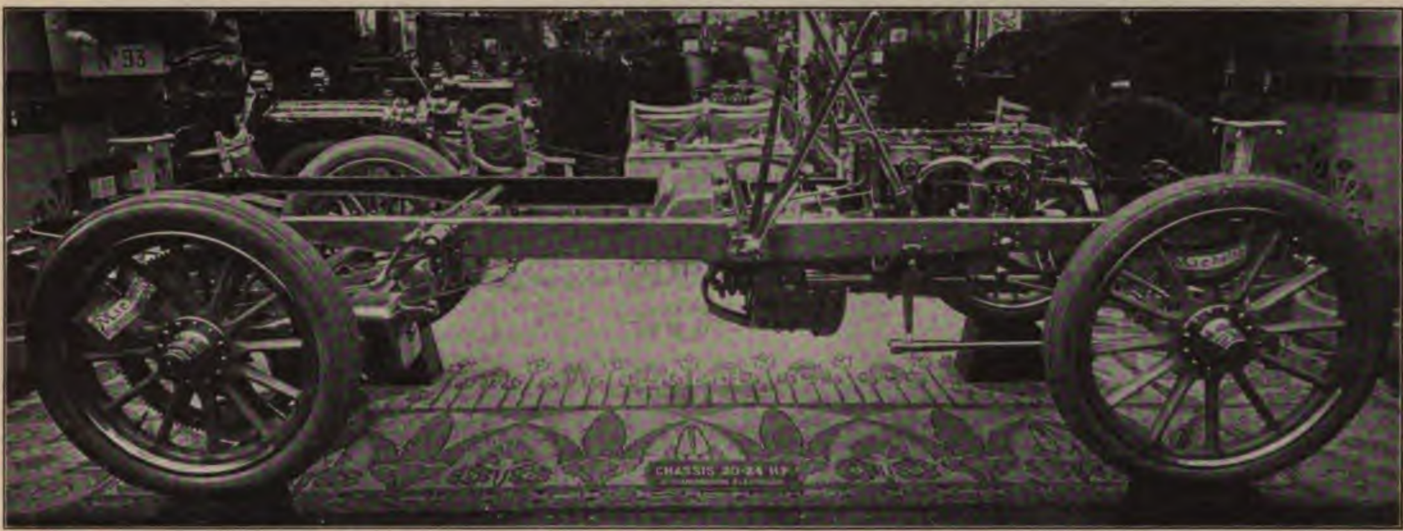
There were a considerable number of other trucks designed along the same lines as those here described, and which need, therefore, not be enumerated separately. The machines shown suggested an interesting comparison of the location of the motor and driver's seat. There were essentially three different arrangements represented, to wit: (1) The motor is located at the forward end of the frame and the driver's seat behind it, as in a pleasure car; (2) the motor is located as in a pleasure car and the driver's seat on top of it, a footboard extending forward from the motor housing in front, and there being no dash; (3) the driver's seat is arranged on the forward part of the frame behind a dashboard, and the motor under the seat. The distinction between the last two arrangements may not be perfectly clear, but it will help to understand the difference better to say that with the former arrangement first the motor seems to have been located in the most convenient place and then the driver's seat placed on top of it, while with the latter first the driver's seat was located where it was most convenient, and then the engine placed under it. In the former the driver's seat is much higher than in the latter.

At one stand were exhibited three big trucks fitted with the Latil fore carriage or tractor, one of which trucks was said to serve the interesting purpose of transporting racehorses to the track; it had an unusually low floor. In the Latil fore carriage the motor and change speed gear are carried on the front axle, which is a combined steering and driving axle. The power is transmitted to the two front wheels by means of internal gears and pinions, the latter on a shaft above and parallel with the front axle, provided with universal joints, the centres of which are directly in line with the steering pivots.

The Krieger Company exhibited a truck with a combination gasoline and electric propelling system like the Fischer, but without accumulators. The vehicle was represented to weigh, empty, 2½ metric tons and to have a carrying capacity of 5 metric tons. A four cylinder 16 horse power gasoline engine drives a dynamo direct connected to it, which supplies current to two motors carried underneath the frame at the extreme rear, one on either side. The drive from the electric motors to the rear wheels is by double reduction—by chain to a short countershaft over the rear axle and from there by spur gears to the rear wheel. In most former combination vehicles the control of the vehicle speed has been effected electrically, and it has, indeed, been claimed to be the chief advantage of this system that the gasoline engine could be kept running at a uniform normal speed regardless of the traction resistance encountered. But this advantage largely disappears when no accumulator is used. M. Krieger controls the speed of his truck entirely by regulating the speed of the gasoline motor, which is claimed to be made possible by a special winding of the dynamo, whereby it automatically generates a stronger current when its speed and consequently its voltage is pulled down by an increase in traction resistance. This winding has, moreover, already been described in the Patent columns of THE HORSELESS AGE. It is claimed that an efficiency of transmission of 70 per cent. is attained between the



Chassis of Panhard 50 H. P. Car—(Notice Frame Construction).



Krieger Chassis with Electric Transmission.

De Dietrich Stand.

Panhard Stand.

engine shaft and the road wheels. The maximum speed, empty, is about 9½ miles per hour, and the truck is claimed to be sufficiently powerful to mount a 10 per cent. grade with full load. Three powerful brakes are fitted. Following are some of the chief dimensions: Diameter of wheels, 64 inches; wheel base, 104 inches; available platform length, 140 inches; width of platform, 68 inches; height of platform from ground, about 40 inches.

Among the other gasoline propelled business wagons exhibited may be mentioned the Hagen truck, with variable throw transmission mechanism and the Renard train, in which the propelling force of a motor on a leading vehicle is applied to the wheels of all the vehicles in the train. Both of these latter were novelties at last year's Show. It appears that a company has been formed to acquire license, under the Renard patents, for one particular department of France, and that a road service of Renard trains is soon to be put in operation in that department.

Steam business wagons were exhibited by the Turgan firm, which has been building such vehicles for nearly a decade, and by E. Zappa and A. Schars, of La Sonys-Floirac (Gironde), who I believe have only recently entered this line of work. The latter firm, which showed a heavy delivery wagon, employs a water tube boiler, with rapid circulation and provision for superheating the steam. The boiler is claimed to be absolutely inexplosible, and is licensed by the French Department of Mines (Boiler Inspection Bureau) to carry a pressure of 250 pounds to the square inch. Solid fuel is used and is fed automatically during a whole trip, the quantity required being emptied into a hopper before starting out. The engine is a double cylinder compound, with enclosed crank and distribution mechanism running in a bath of oil. For starting both cylinders are worked with high pressure steam. The steam distribution is controlled by a single eccentric. The boiler feed is effected by two separate pumps, one of which is directly geared to the engine; the other is an independent steam pump, and is located under the footboard. The arrangement of the various parts of the mechanism is the same as in the majority of steam trucks that have been built in England and America, the boiler being placed in the driver's cab and the engine underneath the platform, at about the middle of the frame. The transmission is by chain direct to a live rear axle, this wagon being one of the very few in this section fitted with such an axle.

The machine tools in the "Serres" (the greater part of which are of American construction) were kept in operation to demonstrate various operations in the manufacture of automobiles which can advantageously be performed upon them; and the gas and gasoline engines were also shown in operation, which feature was instrumental in drawing to the "annex" much larger crowds than usually favor a detached minor section of an industrial exhibition with a visit. The attendance here was notably very much better than in the smaller halls of the Grand Palais, where the exhibits of parts and accessories were installed, and which presented at most hours of the day a rather forlorn, deserted appearance. Unfortunately, however, for the exhibitors in the annex, most of the visitors there came out of curiosity and not for business purposes, and at a considerable number of the commercial vehicle and motor boat stands there was not even an attendant, a sign informing those wishing particulars that same could be obtained at such and such a stand in the Grand Palais.

Some Exhibits.

THE POPE EXHIBIT.

The exhibits of the Pope Motor Car Company and of the Pope Manufacturing Company were advantageously located side by side along the main aisle in the Grand Palais, slightly to the rear of the main hall. The exhibit comprised four Pope-Toledo gasoline cars and one chassis and five Pope-Waverley electrics, including a delivery wagon. The exhibit of gasoline cars included the 50 horse power "Pullman," which has already been illustrated in THE HORSELESS AGE, and a 45 horse power touring car, with very roomy and comfortable side entrance body. The writer had an interview with Mr. Lienhard, manager of the Pope Manufacturing Company's foreign department, who expressed himself well satisfied with the Show at the end of the first week. He said that the Pope interests had taken the initiative in bringing an exhibit to the Paris Show, with a double purpose in view. In the first place they intended to place agencies for their different lines of cars in the various principal countries of Europe, and negotiations along this line were progressing favorably. Then they wished to demonstrate to the automobile buying public in general, and to purchasers of vehicles de luxe in America in particular, that they do not fear to show their vehicles side by side with the best made in Europe. Mr. Lienhard said that aside from the fact that nearly every leading make of cars has some particular feature in which it excels, he thought that his touring cars compared favorably with any at the Show, particularly as regards hill climbing power, noiseless operation, comfortable riding qualities and finish. During the coming season the Pope Manufacturing Company will market two models of popular priced two cylinder cars, one with a double opposed horizontal engine, a type practically unknown in Continental Europe, and it is expected that these will find an extensive market there. Mr. Lienhard stated further that, although their cars had sold very well in the United States during the past several years, they desired to extend their markets, to more fully occupy the large manufacturing facilities afforded by their four plants at Hartford, Toledo, Indianapolis and Hagerstown respectively.

MERCEDES.

There are absolutely no important changes in the Mercedes models from last year, the two chassis to be manufactured the coming season, viz., a 28-32 and a 40-45 horse power, embodying all the well known Mercedes features and no new ones. Some minor improvements have been made, such as lengthening of the body springs and different proportioning of their leaves, to obtain more comfortable riding qualities. The springs are now made 56 inches long, a length which has probably never before been attained in automobile springs. Other minor improvements are an additional oil cup on the clutch sleeve, and means for preventing the oil working through the shaft bearing on the gear box from getting on to the friction surface of the transmission brake and thus reducing its effectiveness. The Mercedes firm had not been able to secure one of the preferred stands of 800 square feet along the main aisle, and showed at its stand in the Grand Palais only one closed vehicle, one side entrance tonneau and one chassis. At the stand invitations were issued to visit the permanent exhibition at the "Mercedes Palace" in the Champs Elysées, probably the best located and most luxurious sales establishment and garage in Paris. The Mercedes chassis in the Grand Palais presented one novel feature which was not alluded to above—it was fitted with pneumatic brakes on all four wheels. These brakes, however, are not the product of the Mercedes firm, but are the invention of an Italian engineer and were fitted at the instance of M. Charley, the Paris Mercedes agent. These brakes are of the internal type, brake drums being fitted to all four wheels, and two compressed air cylinders on the axles, inside these drums. Into the outer open ends of these cylinders fit pistons carrying the brake shoes. The different air cylinders are connected by small tubes with an air reservoir hung under the left hand frame rail, just back of the front spring; and with a control valve arranged on the steering column underneath the steering wheel. This controlling valve is also connected to the clutch, in such a manner that before air is admitted to the brake cylinders, the clutch is always disengaged. A small air pump connected to the engine keeps the reservoir constantly under pressure, and a pressure gauge on the dashboard indicates the pressure acting in the brake cylinders. A brake of this kind may be advantageous on a powerful road locomotive frequently driven at railroad speed, but must be regarded as an unnecessary complication for ordinary touring cars.

(To be continued.)

LESSONS of THE ROAD

4,000 Miles With a Four Cylinder Car.

By R. W. B.

Two years ago there appeared in these columns an account of my season's use of a flash boiler steam Stanhope, and it may be of interest to record my past summer's experience with a larger, heavier rig, with gasoline motor, especially as there is such a universal tendency toward the four cylinder motor for the coming season, and in some quarters a doubt concerning the practicability of the same because of increased "complication." As I employed no chauffeur, and kept the car in my own shed at home, doing all to it that was necessary to keep it in good running condition, and can truthfully say that I did not get so much mileage out of any other half-dozen rigs with so little shop repair, or so little work myself, I do not think the "complication" an item worth considering, and do not expect to own any motor with less than four cylinders, unless I should return to steam.

THE GASOLINE CAR IN HILLY REGIONS.

Steam has certain great advantages of its own, especially in so hilly a region as is Western Pennsylvania, and the probability is that had my 1902 steamer had all the improvements contained in the 1905 model of the same builder I never should have given it up. It is a common claim of the maker of a large four cylinder car that his production is "practically a one speed car"; but that doesn't work out on our hills, though perhaps it may in a level country. In order to get up a really steep hill with a full load in any gasoline rig I have seen it is necessary to rush it, and never let the speed get down. In a majority of cases I find a bad gully, bridge, or track crossing at the bottom of steep grades, and unless one is willing to risk breaking his springs, and is utterly regardless of the comfort of his passengers, he must slow down. After that a change of gear is unavoidable. And I know of many hills here, which, with my car loaded, I cannot climb on second speed. With perfect roadways, such as France and England provide, it is no doubt different, but I have traveled miles over roads so bad that the only comfort was to be had by using nothing faster than the hill climbing gear. On such roads as ours, this gear shifting becomes real labor. I should hardly have ventured to mention this merely on my own experience, because I am far from robust health, and tire easily, but recently I was talking with a friend who seems physically above the average strength, and yet he mentioned as an important demerit of the gasoline car for use in this region the fatigue resulting from this constant gear shifting, which is quite avoided when steam is the motive power.

With my 1902 steamer I had difficulty in maintaining steam pressure over our rugged roads, resulting in much pumping of water by hand, which was quite as fatiguing. To avoid this I was tempted to try a gasoline car, and impressed with the importance of lightness to reduce tire troubles, bought a runabout with a two speed planetary gear. The motor of this car did not prove all my fancy had painted it, but did very well so long as I could run on the high gear. When it was necessary to change to the low, however, the great friction of the multitude of gear wheels in use generated so much heat that trouble followed promptly, and so inevitably that before many weeks had passed I decided that a three speed sliding gear was absolutely necessary to my happiness. I sold the runabout at a great sacrifice and invested in a "touring car." This had a two cylinder imported motor, and proved so reliable that I soon ventured to sell the steamer, which I had kept until then as a standby, too well tested to give up until something better had been found. The new car was very satisfactory so far as operation and power went, but it had such stiff springs that when I was alone in it, which was a large part of the time, the jolting, on anything but asphalt or macadam, was severe.. When winter came, I went to the expense of changing the springs for longer ones, but with little benefit, if any, and the idea of another change lodged in my head, and would not be put out. This finally crystallized in a determination to own a four cylinder car at any cost—the only problem being, Which?

There were four makes of four cylinder cars selling at prices ranging from $3,000 to $4,000, and I studied earnestly the cuts and descriptions of them as they appeared in these columns. In one I had no confidence owing to what I had seen of the makers' previous year's product in smaller cars, and it was quickly eliminated. Another was made by the builder of my two cylinder car, but as he was changing from an imported to a home made motor, I had some doubt as to his experience in that line. A third had the most powerful motor of the lot, but when its transmission was illustrated in The Horseless Age it scared me so that I never even asked a "demonstration" of the car, and I think the experience of purchasers of cars with that transmission has justified me. This left only one, which was the lowest priced and lightest weight of all—two great advantages in my eyes. The best is seldom the lowest in price, but in this case I really think it has turned out so, for after buying that fourth car, and running it over 4,700 miles, as a runabout in the city, and on many rough country trips, I would not exchange it now for any one of the other three.

EXPERIENCES WITH A NEW CAR.

And now for actual experience with the car. The car was not perfect by any means when it reached me. I presume any builder, however careful and conscientious, is likely to turn out an occasional car which, in spite of the most rigid inspection system, will be lacking in some item of adjustment or detail, and I have often said that it seems to be my luck always to get the defective one. My car was one of a "carload" (two) which arrived here June 23, 1904, and I went to the freight station and saw it unloaded. Five gallons of gasoline poured into the tank and water into the circulating system, and then while the hands were getting the other out of the freight car I turned the starting crank for the first time, and put the motor in operation. I ran it down from the freight platform to the ground and started for home, but before going a half mile the motor stopped. I presume a little dirt had clogged the carburetor momentarily, for when the agent came up in the other car he restarted the motor without trouble, and I proceeded out home alone, 5 or 6 miles, with no further hitch. Being in poor health I was not able to use the car much that week, and on July 1 the odometer showed only 10 miles, including the run home from the freight station. After that, however, I began to get some use of the machine. Two or three times the motor stopped, as on the first day, from a little dirt shutting off the gasoline supply, and after a few days it became necessary to adjust the carburetor to take a constantly decreasing supply of air, which showed an insufficiency of gasoline. I examined the pipe and float chamber to no effect, but finally discovered in the place of the usual jet a "spray plug," which in shape resembles a poppet valve, but is screwed firmly down on its seat. There are about thirty-two little scratches in its seat, which form the only passages for gasoline, and, of course, these are easily choked by any deposit of dirt. Cleaning this seat of the plug at once changed the mixture so that the adjusting lever could be brought back to its normal position.

Every time I took the car out it came in with the right rear hub covered with oil, which came from inside the axle tube. Often the oil was thrown on the rim and tire of the wheel, but none appeared on the left wheel. I do not know whether the left side was packed tighter, or the constant running on the right side of the roadway, the crown of road inclining the car to the right, made the oil flow in that direction. The constantly dirty wheel was quite an annoyance, but the effect on the brakes was much more serious, as both service and emergency brakes in this car are applied to one flange on the rear hub —one an outside band, the other an ex-

panding inside ring. Of course these were both drowned in oil, would not hold properly, and if suddenly applied would cause the left wheel to hold while the right did not, resulting in a strong tendency to skid. I took off the right wheel and filled the axle tube with felt washers supplied by the maker, but they had little effect, and oil still came out, although I had added none after receiving the car. It had all been put in at the factory. Finally I drained off all the oil I could and substituted "non-fluid oil," but even after that the trouble kept up on a smaller scale, until the old oil had all worked out. I have never heard that other users of the same car here had similar trouble, and don't know why I had.

While this was going on I was one day climbing a long, rough hill on the second speed, when suddenly the car slowed up and the engine began to race. My first thought was that the propeller shaft had broken, or the bevel gear drive had stripped, though there was no sound of any kind to indicate a breakage. A glance at the gear change lever showed it was in the neutral position. I must explain that in my car the transmission gear is hung on the rear axle casing, and being so placed, while the lever is on the body, it is impossible to lock the gear in its various positions by a latch on lever and notched quadrant, as the motion of the body on the springs would keep the sliding gear constantly in motion, and never long in perfect meshing position. Hence the gears are locked in each position by the engagement of grooves turned in the sliding rod which shifts the gear with two small spring pressed plungers on opposite sides of the rod. I concluded that I had failed to place the gear in the exact position to engage these plungers, and having left them bearing on the straight surface of the rod they were allowed to shift gradually back to the neutral position. The same thing happened on subsequent occasions, when I knew the plungers had been in the notch. I set up the set screws over the springs of the plungers as tight as I could get them, but still the trouble continued, always and only when in second speed, and I could get up any long ascent on the second speed only by constantly watching the lever, and pushing it forward into the notch each time it worked back toward the neutral position.

"LITTLE THINGS."

I should explain that in this car there is a separate lever to operate the reverse, and the main lever has four positions, the extreme rear one being the first or hill climbing gear, next the neutral notch, then the second speed, and finally third speed, when the lever is farthest forward. I have found this arrangement to have at least one advantage over single lever control, in that when the car is almost stalled on a bad hill it is only necessary to pull the lever back as far as it will go, without troubling to see if it is in the notch, while with the other it would be necessary to look to see with certainty that the lever was in the proper notch for the first speed, and not in the neutral, just back of the hill climbing position. This is one of the "little things" which go to make up a really satisfactory and comfortable car to run, and another is the electric button in the steering wheel, which enables the driver to cut out the spark without moving his hand. At first I regarded this device with suspicion, but before long I found it a great help in descending hills. On moderate ones this is often sufficient, as the drag of the motor will alone provide sufficient braking action, while on steeper grades the foot brake can be applied without releasing the clutch, and the engine still helps to hold back. The majority of builders of the "French" control, with foot operated clutch, make both their brakes release the clutch, which possibly is a more "foolproof" arrangement, as a careless operator can then not apply the brake while the power is still on; but for my own use, if I had such a car, I should certainly prefer that the hand brake only should release the clutch, as is the case in this car of mine. The hand lever pulls back, instead of pushing forward, to apply the brake, and is held on by a ratchet quadrant. It will hold the car on hills with clutch disengaged, and it is not, therefore, absolutely necessary to shift the gears to the neutral position when the driver leaves his seat, though no careful man would ever fail to do so.

I corresponded with the builder regarding the gears jumping out of mesh, and was informed that this was the first time they had ever heard of trouble of this kind with any of their cars, though a few, they said, had given trouble through high speed clutch slipping out of engagement. This never happened to mine at any time.

About this time I discovered trouble in the motor lubrication system. This is of the force feed type, employing a single pump, driven from an upright shaft which carries at its top the contact breaker for the jump spark. There is an oil tank on dash, from which oil flows to this pump and is then forced to a small sight feed compartment in the tank. The oil rises drop by drop through glycerine inside the sight window, and when the space above the glycerine is full it flows through a small pipe to the crank case of the motor, the lubrication being entirely by splash. I finally discovered that I was getting too much oil in the crank case and upon investigation learned that the flow of oil down the tube from the top of sight feed caused a syphoning action which drew a great deal more oil to engine when the latter was stopped than the pump would feed when running. The only way to prevent it seemed to be to unscrew the cover over sight feed compartment and let air in until the tube to the crank case had emptied itself. This was a bother to remember at every stop. The engine disappointed me in the item of power, as I had expected it to take pretty nearly any ordinary grade on the high gear, which I found it would not do. The advertised weight of the car was "under 1,900 pounds." This I presume meant stripped of all extras and supplies, and with tanks empty, but I don't use my car that way, and in ordinary running trim, with cooling system full of water, 20 gallons of gasoline in the tank, tools, jack, tire kit and spare tubes, sundries, and canopy top on, the car weighed fully 2,500 pounds. I did not know whether this extra weight, especially that last item, as it considerably increased the air resistance as well, was responsible for the seeming lack of power; though even so, it was disappointing, and I wrote the builders, mentioning the slipping gear, the oil on the brakes and the lack of power, and they soon answered that a representative would be shortly in a neighboring city. They would have him call here to examine my car.

By the time he came the motor was much worse, and when climbing a grade of only 5 per cent. or 6 per cent. would pound badly. The expert arrived, turned the engine over, adjusted the vibrators on the spark coils, discovered a plug which leaked compression, and started out for a trial. Before going a mile, and on the first up grade we struck, he pronounced that the cylinders were carbonized from too much oil, and he had best go back and clean them at once. We returned to my shed and he proceeded to tear the motor all to pieces, taking off all four cylinders. Sure enough, there was a mass of charred oil on each piston head, and this would get fairly incandescent after a short run and cause premature explosions when on a hill with throttle open, high compression and slow speed. The knock was explained. He cleaned the pistons thoroughly, put the motor together again and proceeded to drill a very fine hole in the cap of the sight feed to let air in and prevent siphoning.

Next he took down a part of the shifting mechanism of the transmission to get at the locking bolts of the sliding rod. These should have been cylindrical in shape where they slide under the spring pressure, but he found that some ingenious assembler at the factory had filed them tapering, so they had a rocking motion in their bearings, allowing considerable play to the shifting lever while the point of a bolt was in the notch. He had a spare pair of these bolts with him, which had not been tampered with, and put them in, saying he thought that the trouble was ended. He then took the car out for a short trial, and finding the engine ran smoothly and free from pound, departed on his way rejoicing. This was July 18, and the very next day I was hung up on the road for the first time.

IGNITION TROUBLE.

The electric current is supplied by storage batteries, two being provided in a

battery box in place of a right hand step to front seats. I had been running some time on one of these and concluded I had better have it recharged. I switched over to the other battery, and finding the engine ran all right, starting, in fact, on compression, took out the used battery and left it at the charging station, and proceeded to take a little ride. Before going a mile the motor began to miss pretty badly, but I kept on, trying to correct the trouble by varying the mixture, which can be done from the seat while running. The missing came and went, but I continued to run, until finally while climbing a hill about 3 miles from the charging station the motor suddenly gave up entirely and stopped. It was a hot day. I let the car run back to the bottom of the hill, stopped in the shade of a tree, and began to investigate. The first thing discovered was that no buzz came from the vibrators, so I took the lid off the battery box to examine the wire connections.

While feeling the ends of the wires, the motor suddenly started itself and ran perhaps a half minute, and then stopped again. Further manipulation showed the nuts all tight, but pressure on one of the binding posts of the battery would cause a buzz of the vibrator, but only for a moment. Evidently the connector was broken off the plates, inside the case, which is of hard rubber, with the lid bolted on, and the two posts projecting through. As the easiest way out of it I hunted a telephone and requested the charging station to send me the battery I had just left with them, and then sat down and waited until it was brought to me, after which I ran back and left the defective battery for examination. The next day the agent for my car offered to obtain for me two entirely new batteries in place of those I had, saying several had proved defective, and the makers were replacing them as fast as reported. While waiting for them to come, I tried a set of dry cells to see what service I could get from them, but before I had run 80 miles the engine was missing badly, but this instantly stopped when I switched over to the accumulator, so I try no more dry cells in this car. The new accumulators soon arrived, but missing still occurred on one cylinder, and an examination of the vibrator on the corresponding coil showed it defective. The coil is of French make, and has a double spring, the auxiliary portion carrying a sort of button which, after moving a short distance, strikes the main spring and knocks it away from the contact screw, making a very quick break. I found the button rubbed where its stem passed through a hole in the main spring, and permitted almost no movement of the secondary spring. This was July 23. and the car had run 480 miles. Why this defect had not shown itself earlier is a mystery. I took the vibrator apart, enlarged the hole in the main spring, riveted all together again, and have had no trouble since with that or any of the four vibrators.

COOLING TROUBLES.

On August 2 I went with the same companion, who had been with me on so many trips of former years, to explore a section of the county to the southwest of the city, of which we knew very little. After running some distance on a very fair macadam road we struck a section which was so rough that we were obliged to use the first speed for a time to keep from shaking ourselves to pieces. When past the worst of this, and running over what was not more than an average country road, the engine began to labor and pound in an unwonted manner, and finally gave out. Just as I turned to the side of the road to examine it, it stopped entirely. I had hardly lifted the bonnet when my friend exclaimed: "There it is!" pointing to the fan at the back of the honeycomb radiator, which was minus its belt. Among the little adjustments made by the factory expert when with me about three weeks previous had been the shortening of this belt. I had paid no further attention to it, and never had troubled myself to provide a spare belt, so here we were! I forgot to mention that as soon as the motor ceased running we could hear a violent boiling and hissing of steam from the radiator. I had never fully believed in the utility of that fan before, but here was distinct proof. It simply made the difference between the engines running perfectly, with very little waste of water, and not running at all. My passenger was off in a moment to a house close at hand, and came back shortly with a bucket of water and some pieces of rough twine, out of which he improvised a temporary belt.

It only needed about half the water to stop the boiling and to replace what had been lost from the system, but I had serious doubts of the effectiveness of the twine belt, so we turned back toward a small town which we had passed in search of a sewing machine belt. We had run about a mile when my friend spied our lost belt curled up in the road. I was so busy picking the best path along the rough road that I probably would have run over it without noticing. It had broken at the hole for the fastener, and was so hard and brittle that I felt more inclined to trust to our twine, which was doing very well. We therefore did not put the old belt on, but kept on our way to the town, where we found a sewing machine agency, and obtained a round belt considerably smaller than our original fan belt, but quite able to perform the duty. We also found a lunch which was far better than was promised by the exterior of the "hotel," and spent the afternoon exploring another branch road, which gave us information which was useful in a later trip. To finish the belt question I will say this first one had failed when the odometer showed 715 miles. I at once bought some round belting, cut it in lengths, soaked them in castor oil, and from that time on carried two with me in the car. It was September 14, and the odometer showed over 2,200 miles, when I discovered that the little sewing machine belt was just ready to fall apart at the splice, as the thread had given away where it was sewed, and it had stretched so much that it seemed strange that it had driven the fan at all. So long as it did so I preferred to let it alone rather than shorten it and run the risk of its breaking.

Before the belt incident occurred I found that the transmission gear persisted in jumping out of the second speed when on a long hill, in spite of the new locking bolts, and I still had to watch it constantly. I also noticed that the motor was beginning to pound again on the hills, and before long I was convinced that the pistons were once more carbonized. I wrote to the factory about these two matters, and on August 11 my expert friend appeared again, with the announcement that he was going to make that car right if he stayed a week. Once more he took off the cylinders and found the pistons in same condition as before. He cleaned them thoroughly, put back the cylinders, ground all the valves, and then adjusted them carefully. They are all mechanically operated, and one of the inlet valve stems was noticeably short, as I had shown him on his former visit. He had after his return to the factory sent me one to replace it, but I had never gone to the labor of putting it in. This he now did, grinding it and adjusting the length of its stem so that it opened and closed at the proper point of the stroke; and he also went over all the other valves, drawing some stems and shortening others, at the same time showing me how to test their accuracy at any time by certain marks on the flywheel showing where the exhaust and inlet valves should open and close.

(To be continued.)

It has been suggested that a field is open to the inventor who can devise a motor lamp the rays from which will penetrate fog rather than make it appear like a dense screen immediately in front of the vehicle. The powerful acetylene lamps which make driving safe for both automobilists and the public on dark, clear nights are quite useless, indeed dangerous, when the fog and mist cloak everything in view. It is safer to extinguish the acetylenes and drive only by such illumination as is afforded by the rays of the kerosene side lights. In the early days of the electric light it was promised that the rays therefrom would pierce the fog most satisfactorily, but we now know how misleading such prophecies were. I see that the scheme of placing a handkerchief over the glass, which was suggested by someone who had not tried it, has been tried during the late London fog and found wanting.—*Manchester Guardian.*

New Vehicles and Parts

The Lozier Car.

The Lozier Motor Company, of Plattsburg, N. Y., are bringing out a heavy touring car of the simplex type for the 1905 market. It is equipped with a side entrance body, has a 115 inch wheel base, runs on 36 inch wheels, weighs in the neighborhood of 2,600 pounds, and is designed to run up to 35 miles per hour on the direct drive.

The motor is of the upright quadruple pattern, with cylinders 4½x5½ inches, and is said to develop 37 horse power on the brake at 1,250 revolutions per minute. Like most engines of its class, it has a wide speed range, being capable of a variation from 200 to 1,600 turns a minute, but its normal speed is about 1,000 revolutions per minute.

The Lozier Car.

The cylinders are cast in pairs, with jackets and walls integral and valves opposite. The inlets of each pair are siamesed to simplify piping. The heads, which are cast separately, are screwed into place and shouldered against copper gaskets. Annular grooves are cut in the corner flange and in the main casting, and when the two parts are forced together the soft metal is upset into these, thus forming a gastight joint. The jacket covers are also provided with a special type of joint. The caps which cover the valve pockets are clamped in position by dogs, which straddle the spark plugs and rest on either side of them. There are four eccentric piston rings paired in two slots, and closed with beveled ends.

The wrist pins, which are of tubular section, keyed to the pistons, are hardened and ground by a special process, which is said to insure a high degre of accuracy. The connecting rods are of I section, drop forged and case hardened. The crank ends are offset to secure a liberal bearing without separating the cylinders, and are of the marine type, bronze bushed.

The crank shaft is of mild open hearth steel and runs in three bearings. At the front of the case there is a ball bearing which receives the thrust of the clutch spring. The crank case is entirely of aluminum, divided in the centre by a double wall, which adds to the strength, and at the same gives free access to the central bearing. Large handholes are formed in the lower half directly opposite each of the cranks, giving easy access to the rod ends. The motor is supported directly on the frame, there being no sub-frame.

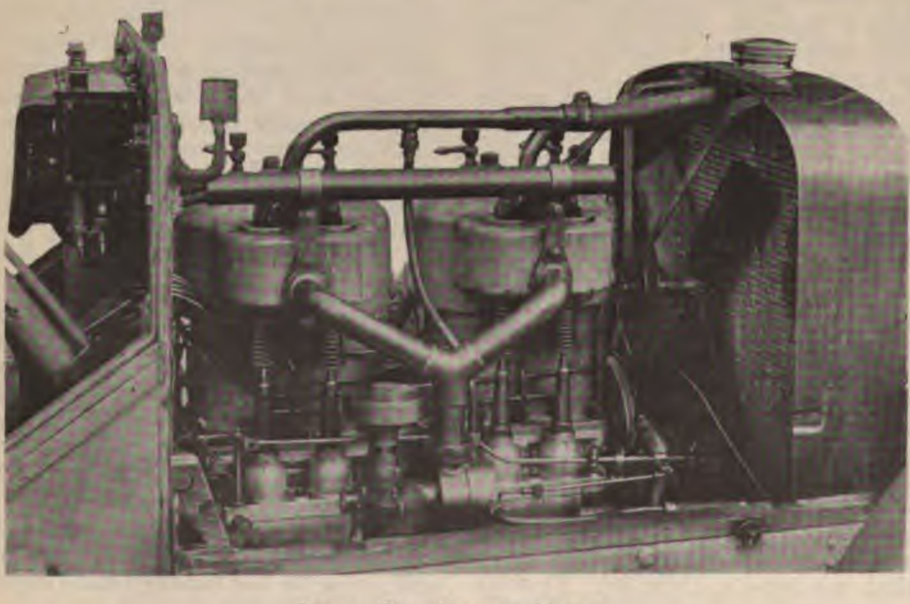
The cam shafts are driven directly from the crank shaft by fibre gears running unenclosed at the front of the motor. The cam lifts are of the roller type without springs, the rods being fitted with brass caps, which set over the ends of the guides closely to cushion the fall and prevent clattering of the parts. The valves are constructed of .035 per cent. nickel steel, and are interchangeable.

The carburetor is automatic, with a specially constructed auxiliary valve.

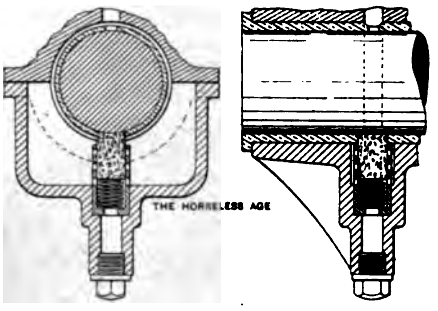
The high tension magneto system is used for ignition, the magneto being located on the left side of the motor, and is driven from the exhaust valve cam shaft by gears. The plugs, as already indicated, are placed over the inlet valves.

The regulation of the motor is automatically accomplished by means of a flyball governor on the inlet valve cam shaft, which is set to cut out at 900 revolutions per minute. It is flexibly connected by springs, with an arm on the steering wheel, which may be set to vary the regulation of the governor, or by an extreme movement to overcome its action and secure a positive acceleration of the motor speed. The control of the ignition timing is also by a lever mounted on the steering wheel.

The motor is lubricated by a force feed oiler mounted on the dashboard, and by splash from the crank case. Both the main and crank pin bearings are provided with a third auxiliary supply to guard against the possibility of their running dry in case either of the regular means should fail. The two views show a section of the outer main bearings cut through the axis of the motor, and on a plane at right angles to it. The oil is fed mechanically to the top of the bearing, and then oil is distributed by grooves in the bushing in the usual way. A pocket or well is cast in the case under the bearing, and all surplus oil is drained into it. A brass tube is screwed into the bottom, and in it is a felt wick held against the under side of the shaft by a spring. The bore of the tube is open to the well through a series of small holes, which strain the oil and prevent any possible accumulation of dirt from affecting its action. A plug is provided on the underside of the bearing for periodically drawing off the accumulated silt. In addition



Lozier Car—View of Motor.



LOZIER CRANK OILING DEVICE.

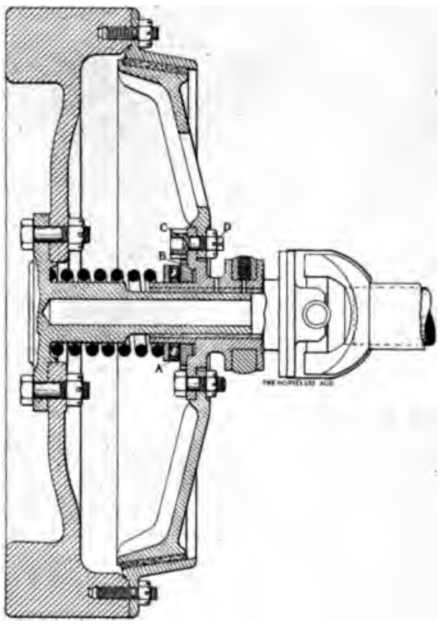
to these a pocket cast in the end of the case catches the free splash of the cranks and feeds the bearing through a separate duct. Each of the crank pins is oiled by a drip feed from the multiple oiler, which comes from a pipe led directly over the bearing as it rotates. A sheet brass cup is affixed to the stub of the connecting rod to catch this and communicates with the bearing through a direct passage. A scoop mounted on the cap dips a portion of lubricant from the pit at each revolution and feeds it to the under side of the pin, while a system of ducts in the crank webs leads to the hollow of the pin and feeds outward to the bearing by centrifugal force. The three feeds are distributed about the pin at an angle of 120 degrees. The cams and their lifts and rollers are oiled by free splash from the case.

The radiator is cooled by the induced current from a large fan, which is belted to the exhaust valve cam shaft. It is of the cellular pattern and has 90 square feet of radiating surface. The cooling system holds 9 gallons of water, which is circulated by a high speed pump geared to the exhaust valve cam shaft, and turning at the same speed as the crank.

The clutch is self contained, and is noteworthy because of its easy demountability, and because of the provision made for varying the spring tension without taking it apart. The flywheel, which is 18½ inches in diameter and 4 inches in width, including the clutch ring, weighs 100 pounds. It is bolted to a flange on the crank shaft, which is prolonged to enter the base of the clutch shaft and form a rigid bearing for it. This also serves as a slip joint to provide for a certain amount of possible deformation in the car. The clutch disc is of aluminum, faced with leather, which is raised at one edge by light, flat springs. The thrust of the spring, which turns with the flywheel, is taken by the ball bearing A in the clutch. The moving race B is threaded onto the hub of the clutch, and has gear teeth cut in its periphery. A stud C passes through the driven member, and on its head is formed a pinion which meshes with the gear B. Its outer end is squared to fit a standard wrench, so that it may be turned to alter the position of the race on the clutch hub, and thus increase or decrease the tension of the spring. The nut D may be set up to lock the adjustment.

The driving effort of the clutch is delivered to the transmission by a universal shaft, provided with two enclosed couplings and a slip joint. When the clutch is to be removed, the forward end of this shaft is disconnected at the joint, and it is telescoped back enough to clear the clutch. A special jack is then screwed into the end of the crank shaft and drawn up sufficiently to depress the clutch. The clutch ring may then be unbolted from the flywheel and taken away, after which the jack may be relaxed and the clutch removed.

A plan view of the transmission with



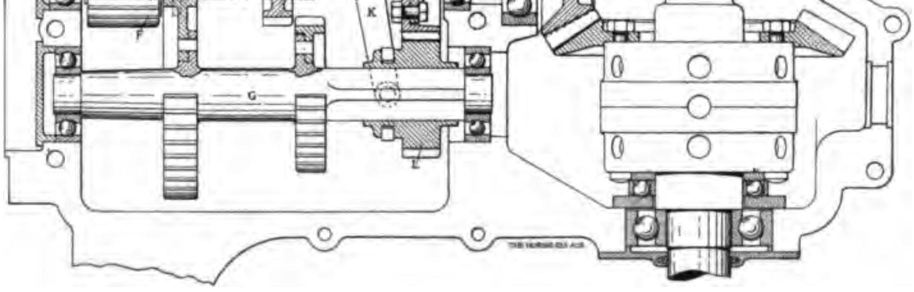
LOZIER CLUTCH.

the upper part of the case removed is given herewith. The gears are shown in the neutral position. To obtain the reverse, the sliding arm E is moved backward, throwing the long faced idler F into mesh first with the low speed gear on the countershaft G, and then with the low speed pinion on the driving shaft H. The three forward speeds are obtained in three successive positions of the sliding member I. As it is advanced from the intermediate to high gear, a roller, J, mounted on the arm K, comes into contact with a cam slot in I, and K swings about a fulcrum in the case and throws the pinion L out of mesh, thus stopping the countershaft G. At the same time a claw clutch on the sliding train engages a similar claw on the driven member M, to secure the direct drive. Each of the three sliding members is securely interlocked in any position, the action being positive. The control is by a single lever acting on the selective system.

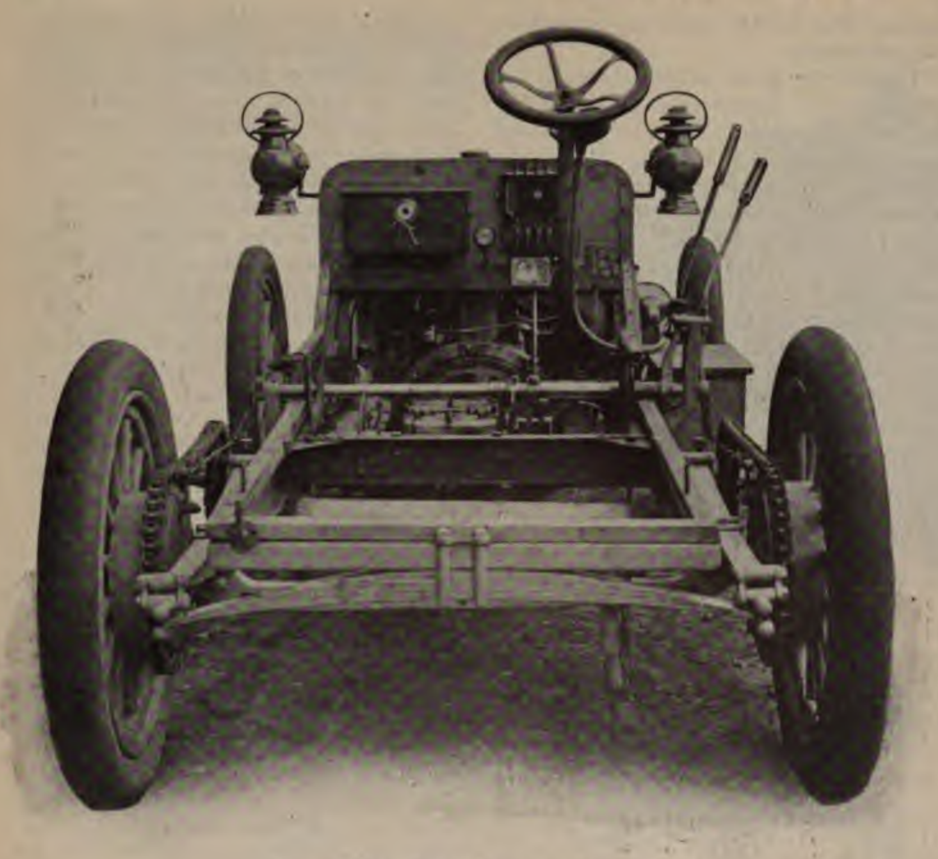
The ratios of the different speeds, taken in revolutions of the rear wheels per turn of the motor, are: For the low and reverse, .103; the intermediate, .238, and the direct, .354. All shafts are mounted in Hess-Bright ball bearings, which are protected on the outer side by felt dust washers. The thrust of the bevel gears is taken by this same type of bearing on the driving shaft, and by a simple ball thrust on the differential shaft. The differential, which is of the bevel gear pattern, is carried in a compartment of the gear case and mounted an ball bearings, as are also the outboard bearings on the frame.

The gear case, which is of aluminum, rests on a cross member of the frame at the rear, the latter being dropped to the proper level. The front end is supported on either side by an arm, which is secured to the under side of the main frame by a pressed steel suspension arm. The effect is that of the three point suspension system.

The frame is made up of pressed channel steel members, tied together by three crosspieces, strengthened by riveted gussets at the joints. The front crossbar carries the



LOZIER CHANGE GEAR BOX.



Lozier Car—Rear View of Chassis.

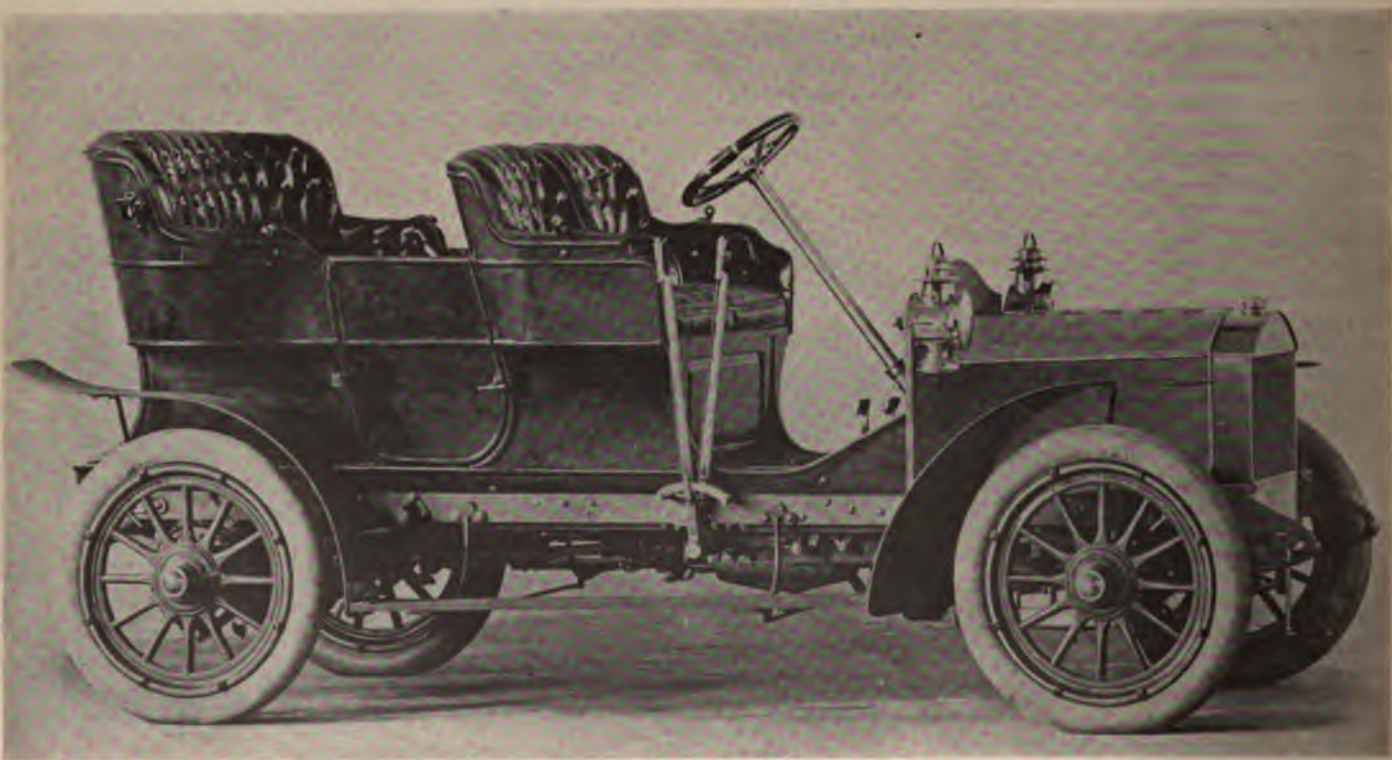
radiator, the second, as already mentioned, carries one end of the transmission and the third is at the rear. The engine and transmission are connected by a heavy aluminum dust pan, which is fastened to the frame, thus obviating the necessity of a fourth cross member.

The spring arms are forged and riveted to the frame at the front and rear. The rear ends of the front springs are shackled directly to the frame by compression links They are 38x1¾ inches in size, and semi-elliptical, while the rear suspension is a full platform, set very low and made up of 42½x2 inch members The wheels are of the usual artillery pattern, equipped with 36x4½ inch clincher tires. The foot brake is connected to a friction band in the differential shaft, and the emergency lever actuates an enclosed expansion brake on each of the hind wheels. It is not interconnected with the clutch. The axles are of I section, forged from nickel steel, and both are cranked.

New Packard Ignition Cable.

The Packard Electric Company, of Warren, Ohio, send us particulars of their high tension combination rubber cable, a new article of manufacture. Rubber cable has been covered heretofore with a friction tape or by cotton braid saturated in an asphaltum compound. The tape covering ruptures when given a sharp bend and the asphaltum compound is soluble in oil. In the new combination rubber cable a coarse weave is applied, which is given two coats of enamel, then a double whip cord braid is applied and three more coats of enamel. The enamel is baked in a steam heated oven after each coat. The company also offers a new "bunched" high tension cable and their older "cambric" high tension cable, strengthened by the addition of two more layers of tape, making eight layers of three coat enamel tape, two windings, two braids, four coats of enamel and four bakings.

Below is shown a photograph of the new four cylinder Autocar which was fully described in our issue of November 23. Attention may be called to the low construction of the car and the simple control mechanism.



The 1905 Autocar.

THE NEW GREAT ARROW.

New Pierce Great Arrow Cars.

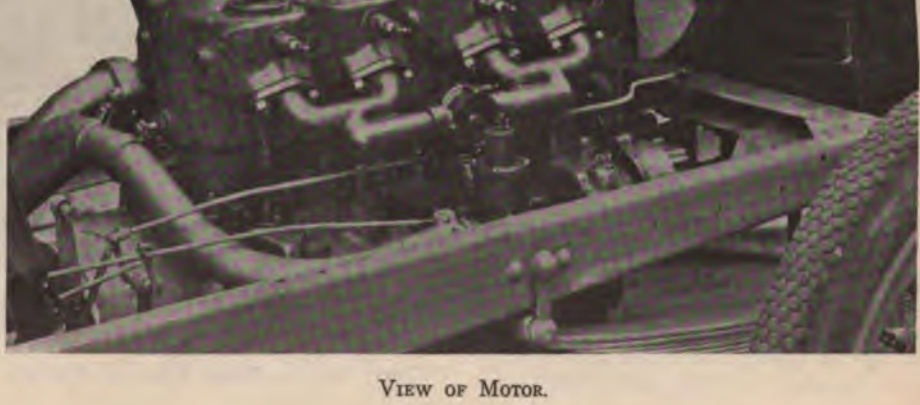
No radical changes are seen in the new Arrow cars made by the Geo. N. Pierce Company, of Buffalo, N. Y. Their 1905 product will, however, embody several detail improvements, which were suggested by experience with their 1904 models.

The motor of the new Great Arrow is rated at 28 to 32 horse power. It is equipped with a rotary gear pump for drawing the oil from the bottom of the crank case and delivering it to the supply tank at the top of the cylinders. A reciprocating pump was formerly used for the purpose. In the new construction the pump is driven by a worm gear from the exhaust valve cam shaft. Last year a centrifugal water pump was used, while this year a gear pump has also been adopted for this purpose, it having been found to give better circulation at low speeds.

A ball bearing thrust has been added to the clutch for the shifting collar, in addition to the regular ball bearing spring thrust. Ball bearings are used in the transmission, as before, the construction having been found satisfactory, and the countershaft drive for all speeds, which the makers claim to be just as efficient, if not more so, than the direct drive with running countershaft and plain bearings, is still retained.

The Cardan shaft brake has been removed, both brakes now acting directly on the rear hubs, one set being of the internal and the other of the external type. The latter are operated by a hand lever on the right side of the car. The brake shoes are of steel, lined with bronze friction strips, which can readily be replaced. The shoes are pivoted at the bottom to a rigid bracket and the upper ends connected together by a toggle arrangement. A coiled spring keeps the shoes away from the drum when idle, and a locking device on the operating handle locks the brakes in any position. The internal shoes are operated by the foot lever; they are also of steel, faced with bronze. They are pivoted at their lower ends and are forced apart by a cam arrangement at the top. These are also kept from rubbing when idle by a coiled spring. They are both equally effective in either direction, and are interlocked with the clutch, so that it is impossible for the latter to be operative when applying the brakes.

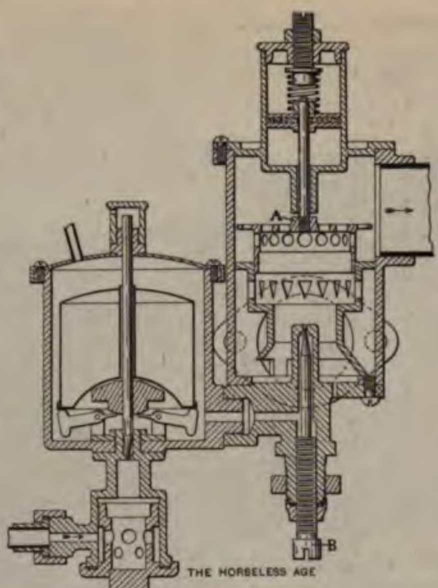
The driving axle has been increased from 1 7-16 to 1⅝ inches in diameter. The arrangement of the steering post has been changed to be more convenient for handling the levers, the change gear lever being on the left hand side, while the spark control and throttle levers are



VIEW OF MOTOR.

on the right, within easy reach of the fingers without removing the hand from the wheel. The body is of the King of Belgians side entrance type, made of cast aluminum, which is claimed to be superior to those of sheet metal on account of the liability of denting the latter. The doors swing clear of the mudguards. The rear seat has ample room for three people, and the front seats are of the individual type. The dash, an aluminum casting, is dished and contains two lockers besides the four coils, electric gauge lamp, etc. It is trimmed with solid brass molding. The wheel base of the 24 to 28 horse power car is 100 inches and that of the 28 to 32 horse power is 104 inches, the weights being, respectively, 2,500 and 2,700 pounds. The tread of each is 56 inches.

The carburetor is of the automatic type. The float chamber and spraying nozzle are of the typical French type. It will be noticed in the drawing that there are two inlets for the air in the position shown, which is that which is taken when the engine is at high speed. At low speed the auxiliary air valve A is down to shut off the side holes in the movable and stationary parts. This compels the air to be drawn entirely through the lower inlet and past the spraying nozzle, thus giving an increased suction for starting and for low speeds. As the engine speeds up the air valve is lifted by the suction and allows more air to enter and mix with that from below. To prevent chattering or dancing a dashpot is provided at the top, which dampens the movement in either direction. The tension of the valve is regulated by the spring shown in the dashpot cylinder, while the mixture regulation is obtained by the screw B at the bottom.



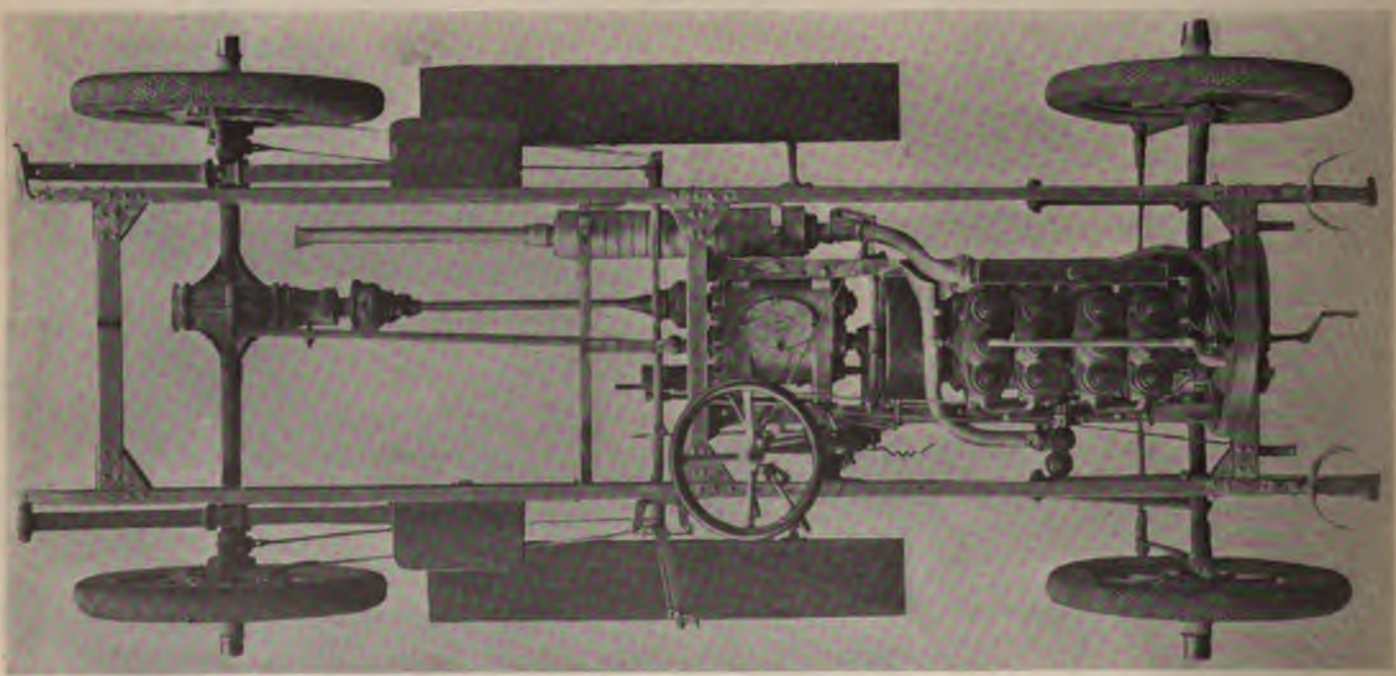
GREAT ARROW CARBURETOR.

The Frayer-Miller Car.

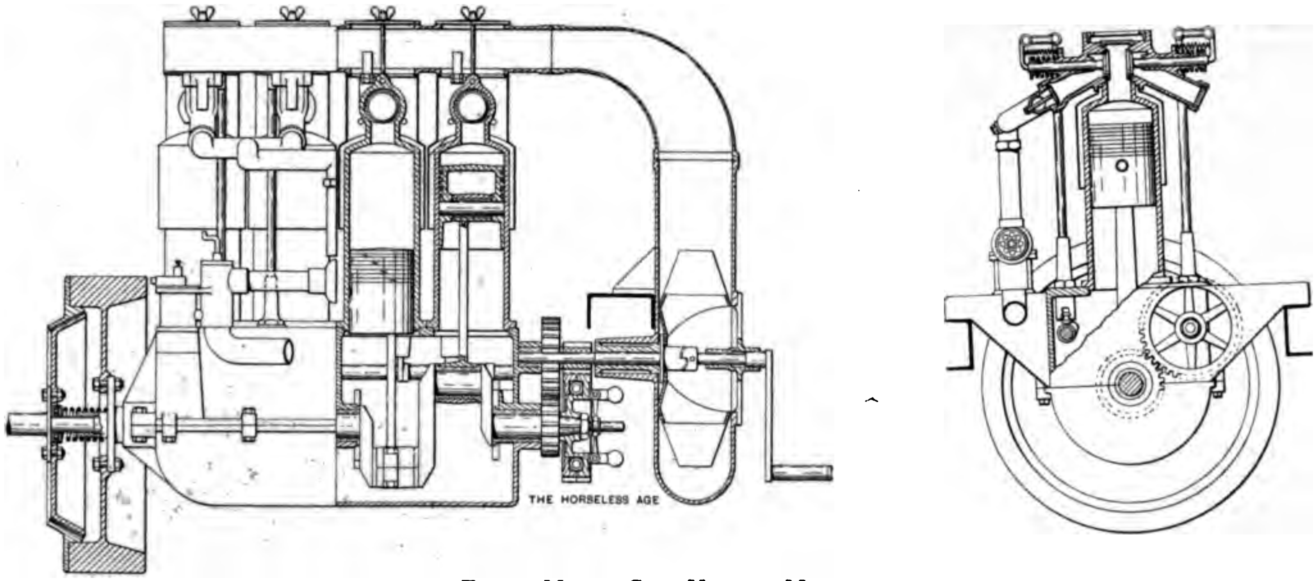
The Oscar Lear Automobile Company, of Columbus, Ohio, are engaged in the manufacture of a large touring car, fitted with a motor which is cooled by air in a novel manner.

The motor is of the four cylinder vertical type, having bore of 4 1-16 in. and 5⅛ in. stroke and is said to develop 24 horse power. The construction is shown in cross section in the accompanying drawing. The cylinders are cast separate and are of hard gray iron, the head and walls of the cylinder underneath the air jackets being covered with small conical spikes close together. The valves are placed opposite and at right angles to the bore of the cylinder in a head which is cast integral with the cylinder. The intake valves are arranged on the right hand side of the engine and the exhaust valves on the left. The spark plugs are in a vertical position in the top of this valve chamber. The valve chamber being very narrow, just sufficient room is allowed between the valve heads for their required movement. By this arrangement the incoming cold gases sweep over the exhaust valve heads and tend to cool them. The valves are operated by two independent cam shafts located on opposite sides of the engine, one on the intake and the other on the exhaust side, and the motion is carried from the cam followers proper to the valves by means of push rods and bell cranks pivoted in arms extending from the valve seat proper. The latter are secured to the head of the engine by means of three bolts with nuts on each side, so that either seat can be taken down without disturbing the other. The joint between the valve seats and cylinder head or valve chamber is made tight by the use of copper gaskets. A single copper gasket on the intake side and several gaskets on the exhaust side are opened to form radiating flanges in order to secure an increased cooling effect at the exhaust valve seat.

Each cylinder is supplied with an aluminum jacket fitting closely over the spiked part of the cylinder which extends up to and surrounds the valve chamber, openings being left in the sides so that the valves can be inserted or taken down without disturbing the jackets. On top of the jackets rests a distributing pipe from the blower by means of which each cylinder has distributed to it its proportionate amount of the moving air. The crank case of the motor is of cast aluminum and is arranged with independent



GREAT ARROW—PLAN VIEW OF CHASSIS.



Frayer-Miller Car—View of Motor.

caps under the crank shaft bearings so that the bottom may be taken off to make any adjustment necessary without disturbing the crank. The cylinders are bolted with long bolts, extending through the entire top of the crank case, and engaging with caps under the bearing bushings, thus relieving the crank case of the tension strain of the explosion.

The lubrication of the entire car is furnished by an eight feed mechanical oiler, driven direct from the cam shaft. Four of the feeds lead to the engine proper, one to the blower bearing and three to the transmission. Oil for the engine is pumped through four pipes into centrifugal oiling rings fastened on the cheeks of the crank shaft. These centrifugal rings throw the oil through the crank pin first, the other parts being lubricated by means of the splash. In this way these parts are assured of adequate lubrication, it is said.

The governor is of the fly ball centrifugal type and is placed in the gear driving the blower, which revolves at the same speed as the crank. Motion is imparted to the throttle by means of a pivoted lever, acting against a spring, the lever being directly connected to the throttle. Acceleration of the engine is accomplished by compressing a spring on the throttle valve rod, which acts with those on the fly ball governor and thereby limits their action.

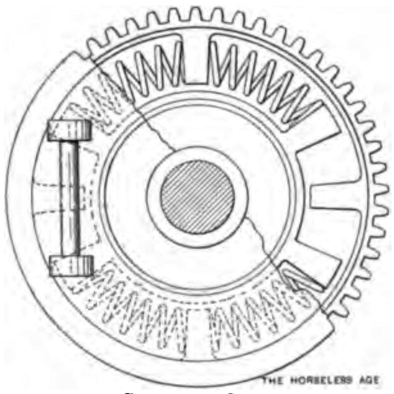
The engine is, therefore, always running under the governor, except when the control lever is thrown farthest forward, and the spring being fully compressed holds the throttle open against the efforts of the governor. The lever moves over a notched sector and is therefore locked in any position.

The pistons are cast of hard gray iron, and are supplied with four rings. Hardened steel wrist pins are located in the centre of the pistons and bear in bronze bushings in the ends of the connecting rods.

The rings are of the returned type side tongue, lapped with one-quarter of an inch face, and are free to turn. The inside of the piston head proper is covered with conical spikes similar to those on the walls of the cylinder, but 1 inch long, the purpose of which is to aid in the cooling of the piston.

The connecting rods are dropped forged, the piston end being solid and the crank end being split and supplied with a steel cap. The crank bears in bronze bushings cast in gridiron form and filled with nickel babbitt metal, giving a surface approximately one-half bronze and one-half babbitt.

The crank shaft is of hammered open hearth steel cut from the solid billet, all bearings are 1⅝ inches diameter, the crank pin bearing 2¾ inches long, the centre and forward main bearings being 3 inches long, and the bearing next to the flywheel 4 inches long. All the bearings are similar to the connecting rod crank bearings. The crank has but one centre bearing. The cheeks of the crank shaft are 2¼ inches deep, the short cheeks being three-quarters inch thick and the long cheek 1 inch thick. The flywheel is secured to the crank shaft by means of bolts passing through a flange



Cushion Gear.

integral with the crank shaft. It is 18 inches in diameter, weighs 140 pounds and has the clutch ring bolted to it. The clutch is faced with mineral leather, and secures its gripping power from a helical spring provided with a ball end thrust. A flexible driving medium is provided between the clutch and transmission to take care of any change in alignment. The air for the cooling system is provided by a single opening blower faced forward. This blower is driven by means of spring cushion gears to guard against shocks such as would come from the quick starting of the motor. It is geared to run four times as fast as the crank. The starting crank is attached to the blower shaft, and an increased leverage is thereby obtained, with a view to making starting easier.

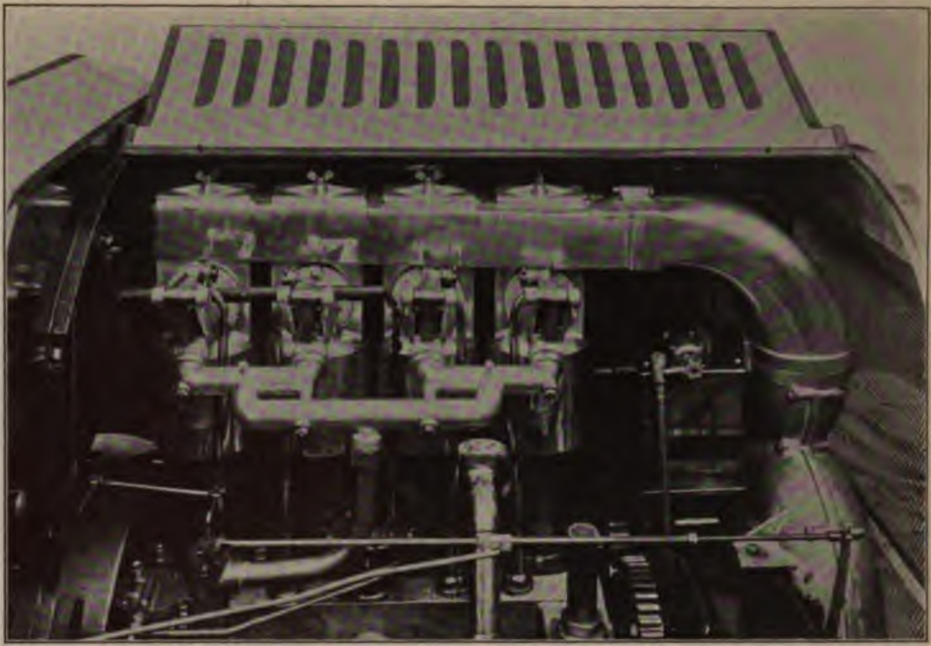
The blast wheel is made of aluminum throughout and the blower casting is of the same material. The blower shaft runs in a babbitt bearing, supplied with oil direct from the force feed lubricator. The sketch accompanying illustrates the cushion gear used in this motor. The centre of hub is keyed securely by a taper fitting to the crank shaft, the outer portion having a toothed rim in two parts, divided on the plane of the gear, lugs being provided with proper stops both on the centre hub and outer rim. Curved helical springs are inserted between these lugs to allow the outer or toothed rim to oscillate about the centre hub. Stops are arranged so that springs cannot be compressed to a detrimental point, or in case a spring should break the fan would still be driven. The object of the cushion mechanism is to absorb shocks in either direction.

All the air pipes are made of aluminum to secure lightness, and the curved sections are made so that they can be taken apart readily, and are made of such shape and size as to have an area at all points equal to the full discharge opening of the fan. The distributing pipe has openings corre-

sponding to the opening of the jackets on either side, or top and bottom, the upper ones being covered by plates which are readily removed for examining the spark plugs. The pipe is tapered from the centre of the front cylinder to the rear, so that each cylinder gets its proper portion of air.

The jump spark system is used throughout, the current being furnished by a sparking battery. A quad vibrator coil is used. The commutator is of the roller type, with large surfaces, and is mounted on a dead bearing and is driven by a bevel gear from the cam shaft. The secondary wires run through the dash into the air pipe. The carburetor is of the float feed type, the gas spray nozzle having a single opening and the hot air being drawn from underneath the air jackets about the cylinders. A cold air auxiliary is supplied in the head of the throttle, located some distance from the carburetor proper. The spray nozzle is surrounded by a disc having an opening in the centre, outside of which are two fan shaped openings which are covered or partially covered by corresponding fan shaped plates. The adjustment of the mixture is accomplished by covering these fan shaped openings more or less by the adjusting plates.

The change gear is of cast aluminum and carries bearings of the semi-babbitt bronze type previously described. Three speeds and a reverse are provided and the various speed ratios are obtained by a single lever shifting mechanism. The ratios of the various speeds are as follows: Reverse, 1 to 4; first, 1 to 3; second, 2 to 3, and third, direct. All gears are of 8 pitch, have faces 1 inch wide and are made from steel, case hardened. Each of the various bearings is oiled by a separate pipe from the lubricator. Universal joints are self-lubricating, the cross being made of large diameter, and are supplied with a large cavity, in which wool waste saturated with heavy oil is placed. The centrifugal action of the revolving knuckle joint forces this oil out around the driving pins. The whole construction is made of soft steel, case hardened and constructed in ample proportions, with a view to securing a maximum of wear with a minimum of attention. It is dust and water proof.



Frayer-Miller Car—View of Motor.

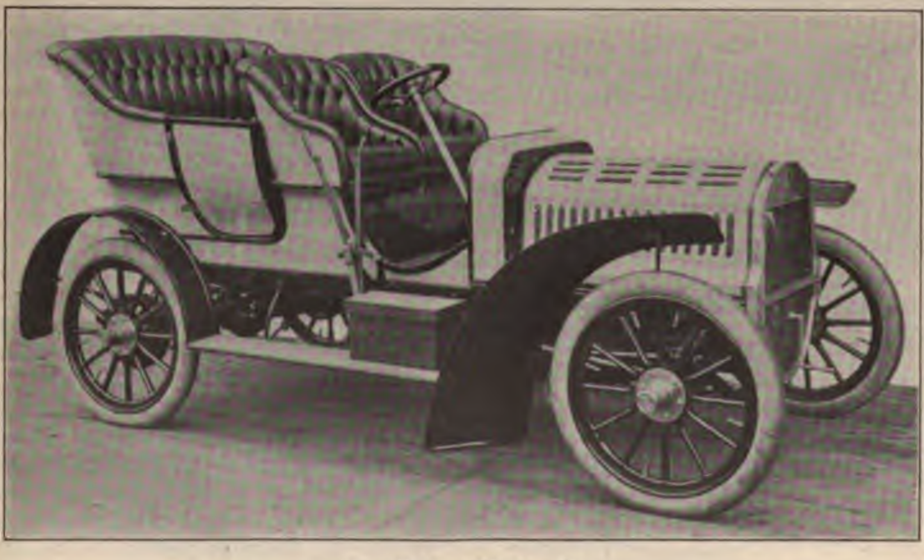
The rear axle is of the bevel gear type, the gears having 21 and 54 teeth, respectively, of 5 pitch, 2 inch face, and are made of mild steel, case hardened. The differential is of the bevel type, consisting of two bevel gears and four bevel pinions, 8 pitch, 1 inch face.

The differential housing is made of steel casting and is split in the centre. The same bolts, which bolt the differential together also bolt the driving gear into position. It is provided with trunnions which extend out to form bearings on either side of the drive gear, the axles proper having a bearing within the trunnion of the differential. A ball end thrust is provided on either side of the differential to take the end thrust from the drive and also that of the car. The bearings carrying the load of the axle and differential trunnions are bronze bushed and provided with large oil cups filled with wool waste saturated with oil, and of similar construction to those used in railroad practice. The spring brackets are pivoted to afford free action to the springs without tendency to twist the pinion shaft out of alignment. The axle housing is a steel casting, being brazed to tubular extensions which carry the spring hangers. It is split vertically and is secured by bolts, which pass through lugs formed on it. The housing of the pinion shaft is screwed into the main housing. The pinion shaft and the Cardan yoke are one piece and run on three Timken roller bearings—one bearing is beneath the pinion and two are above. Those above the pinion are arranged to take the thrust of the gear and the one beneath the pinion to take the thrust from the rear wheels. The torsion rod of this axle has a bearing in a sleeve cast integral with the housing and is supported on the frame carrying the transmission.

The frame is made of pressed steel and is provided with a sub-frame, secured to the cross members, which carries the engine and change gear box.

Three point spring suspension is used, the cross spring in front being 2½ inches wide, the rear springs, of semi-platform type, 2 inches wide. All springs are built up of thin leaves.

Brake drums are provided on each rear hub, and another is located on the transmission shaft. The total weight of the car is about 1,650 pounds. The general outline of the car is quite pleasing to the eye.



The Frayer-Miller Car.

COMMUNICATIONS

Taxation of Automobiles.

Editor HORSELESS AGE:

I have noticed that the Automobile Club of St. Louis, Mo., is having three ordinances drafted for city use. One of them is a license ordinance which calls for a $3 yearly tax for a one seated vehicle, $5 for a two seated one, $6 for four seats, and over that number $10, trucks weighing 1 ton, or less, $7 annually, and those over 1 ton, $10. Why the members of the Automobile Club of St. Louis are so anxious to tax themselves for owning automobiles I do not know. No matter from what side we view this question, a tax or license fee on automobiles or any other vehicle is not alone an injustice to the owners of such, but it acts as a check on the progress of the automobile industry.

On the face of it the automobile license fee seems just, because the community is put to an extra expense to keep reckless automobilists in check, and, therefore, it is claimed they ought to pay for this expense in a license fee. But let us see. It is true the community is put to an extra expense in issuing licenses and number tags, and employing special police, but this is done not for the exclusive benefit of the automobile owner but rather for the benefit and protection of every member in the community. Therefore, if the community issues licenses and tags and employs special officers, the expense ought to be paid out of the general tax fund and not out of a special tax or license fee levied against the automobile owner.

Again, a license fee or a tax is urged for this reason—the automobile owner uses the streets and highways, therefore he ought to contribute toward paving streets and building highways and keep same in repairs. This is the stock argument of the high license fee advocate; and automobile owners who have not studied the question of taxation bow to its logic and allow themselves to be fleeced by cunning lawmakers.

No doubt the automobile owner ought to contribute toward the expense of paving streets and building highways, but he does this when he pays his rent to his landlord.

In the first place an automobile license fee, the proceeds of which are used for the improvements of streets and highways, adds nothing to the value of an automobile, but it adds to the value of the city lots along the streets and the land along the highways improved with the money raised by this tax. It is, therefore, wholly unjust on the part of any government to get a revenue from a tax or license fee on automobiles for street or highway improvements. If there are any street or highway improvements to be made it is the function or the duty of a government to get its revenue from those who get the pecuniary benefit of such improvements in increased land value, the owners of land. To make this point more clear let us take two towns in every respect the same, but with the exception that one town has fine and well kept streets and the other has very bad and dirty streets. Which one of the two towns will bring the highest rents? Certainly, the town with the best streets. Every automobile owner wants to live there in order to make use of his automobile, and he is willing to pay a higher rent for this privilege. This clearly shows that all improvements of streets or highways in any community express themselves in increased land values, and consequently in increased rents for land owners. These facts absolutely take all force out of the arguments of the high license fee advocate, because every automobilist pays his just share toward improvements when he pays his rent, and any attempt to collect a license fee or tax would be robbery.

P. CULLMAN, JR.

Pro Mechanically Fastened Tires.

Editor HORSELESS AGE:

While a frequent reader of your admirable paper, and usually in entire accord with your sentiments on automobile matters, I cannot refrain from a word of protest against your article in the issue of December 14, deprecating on the whole the efforts of inventors toward the development of mechanically fastened tires.

I purchased my first automobile about seven years ago, when the automobile industry in this country was in its infancy, and throughout all the vicissitudes of my experience the clincher tire has been to me a makeshift and an unmechanical mechanism. The clincher, be it ever so good, and many of them I have no doubt are excellent, as far as tire construction goes, is a kind of fair weather ship, inasmuch as its powers of holding on are weakest just when you need them most, namely, when it is deflated.

Again, anyone who has struggled, after nightfall, as I have done, for three hours with a stiff necked and hard hearted outer casing before it could be persuaded to "cease its troubling," will agree with me that barring the advent of the perfect non-puncturable, yet fantastically resilient tire, an inferior tire, with some respect for our muscles, our tempers and our desire to get on, is a better friend, when far out on the road, than an intrinsically superior tire ready to tire us in good earnest when we are most at its mercy.

Another point, I think, is the rim. With the clincher rim, limping on without a repair to the nearest resting place, is apt to prove a very expensive experiment; but with a flat rim one is hardly likely to sacrifice more than an inner tube.

Of course I have no axe to grind and no affiliations, direct or indirect, with either industry. I only wish to say a word of appreciation of the efforts of the men in general who are trying to work out a part of the tire problem in what would seem to be a useful direction.

A. S. L.

Editor HORSELESS AGE:

I have been reading the many communications and editorials in your substantial journal with great interest, especially those dealing with tire troubles and the needs for their remedies.

I disagree with your editorial of December 14, in which you criticise inventors for seeking a solution for the hard job of detaching tires to make repairs on the inner tubes. Your editorial admonishes people of inventive turn of mind to direct their energies along the line of constructing a tire that does not need removing from the rim for repairs. Our opinion is that the double tube pneumatic tire is the ideal tire for comfort, and that a single tube tire will never be constructed so as to require no repairs, therefore the necessity for removing the outside casing to effect repairs of the inner tube will never be completely avoided. Admitting this to be true, the inventive genius of our people is directed along the right lines in seeking to effect an easy and quick means of getting at the inner tube.

I have noticed lately several patents for a detachable single tube tire which seems to be all right as far as holding the air, but even if this is true, what will a man do when he has a leak so small as to be unobserved by the naked eye? Of course, if one has a suitable basin and water handy the leak might be found in the usual way, by submerging the tire to detect the air bubbles. This would be easy, provided you have a tub and water handy, and provided the puncture was a clean cut one; one which let the air out opposite the puncture of the inner wall of the tire. Our experience is that many times a leak showed up all over the outer casing, and it was impossible to find the puncture on the inside. Everyone who has had experience with single tube tires knows that you cannot always find where the air comes through the inner wall. Especially is this true after the tire becomes old, allowing the air to follow around between the layers of fabric and come out at a cut in the outer rubber several inches distant from the actual puncture. I merely call attention to these facts to prove the necessity for an easily detachable tire, and not to run down the single tube construction. It has its good points, but the trouble in finding and mending a puncture, even if you can get at the inside, is sufficient to prove the correctness of the

double tube detachable tire over the single tube construction.

More tires are ruined from running them flat or partially so than in any other way. But very few good tires ever wear out. If the fabric is good and the tire is never allowed to run flat, it ought to stand for many half solings. If the method of detaching was simple and quick, so that a new inner tube could be put in without the loss of so much time and the great exertion required to detach from our present structure of rims there would be less complaint about tires not wearing.

The present method of stretching the edges of tires to get them off the rim is certainly very clumsy and hard on the tire and ought to have been abandoned years ago by the substitution of something better by tire manufacturers. In less than another six months there will be improvements which will admit of the detaching of tires in less time than it takes to tell it, and without the necessity of a man having hands and muscles like a pugilist to accomplish the feat. It is pleasing to note that already wonderful strides have been made along this line by one firm, and so far as their particular style of tire is concerned the method of detaching is ideal, but the fellows who make the old clincher (and they are largely in the majority all over the world) will be compelled to get a hike on themselves or be contented to furnish tires to those only who are too poor to change rims for the new method of detaching.

The next thing that must follow rapidly upon the improvements of rims is a pump that is operated by the engine while the car is standing still. The labor necessary to pump up flat tires on large automobiles, which are usually owned by those who are the least accustomed to work and who have the greater aversion to manual labor, is the cause of more ruined tires than the actual wear upon them. A tire can be hurt worse by running it 10 miles flat than by running it 500 or 1,000 miles properly inflated. The writer speaks from actual experience upon the subject of pumping up tires, and labor is no stranger to him, either. Its the kind of labor and the inopportune time at which it must be performed that are distasteful. So much so that the car your correspondent rides in has a power pump on it, and his tires can be inflated after being put on the rim before half the tire bolts are tightened up. If it were not for the detestable job of stretching our tire casings off and on, one motorist at least would feel that it mattered but little whether he received a puncture or not. Five minutes' time with no labor attached, except that which is necessary to change inner tubes, would put him on the road again with a stiff back and linen collar that did not resemble a rag the very warmest days in July. J. M. PADGETT.

2,505,900 tons of iron and steel were exported from Great Britain during the year 1903.

Oil Cooling Proved Unsatisfactory.

Editor HORSELESS AGE:

In the December 14 number of THE HORSELESS AGE I notice A. N. Clark's experience with "cooling oil," and his inquiry as to what luck others have had with it.

When the mercury here began to hover around the freezing point, I went into partnership with some friends and bought half a barrel of "cooling oil" from Logansport, Ind., and concluded we would be fixed for this winter's cold. Shortly after the oil arrived, one of my friends and I ran our machines into my garage, where we built a roaring fire, and left the machines to get thoroughly warmed. Of course, we had drained the water some time before, but have found by experience that water will pocket in the cooling system in spite of the best you can do at draining. After our machines were thoroughly warmed we filled them with the oil. At first we had a little trouble in getting the oil to circulate, on account of ice that had formed in pockets, and would not melt, but after running the motors on a closed throttle for some time we had the satisfaction of feeling the radiators get warm, and we drew off oil and water from the various drainage cocks until no water appeared with the oil. We then turned off the batteries, put more coal on the fire and left the machines to keep good and warm. Late in the afternoon we took them out. I ran my machine from the house to the office and then to the depot to meet my wife, whom I expected on the train. On reaching the station and turning off the batteries, the engine kept exploding for perhaps half a minute. Naturally I felt somewhat surprised and concluded there must be some stoppage in the circulation. I tried all the cocks, and the oil ran readily, with no water, and the radiator was hot. After meeting the train, when putting the machine up at home, the engine acted the same way as at the depot. Of course, I felt much disappointed with the oil, but before condemning it I concluded to draw it all off, take apart the water pipes and see if there was any obstruction anywhere. This I did, with the help of two friends, and could not find anything wrong, so put the oil back and tried the machine again; but it was no use. To thoroughly satisfy myself it was the fault of the oil I drew it off again and filled the system with water, took my friends on a ride, and the motor did not heat at all.

From the foregoing experience I have concluded that at least one particular brand of "cooling oil" is no good for my machine, and my friends have had the same trouble with their engines as I, but the machines being all the same make I do not suppose you could expect anything else. ROBT. W. PRATT.

Mud Guards Fastened to Axle.

Editor HORSELESS AGE:

In your issue of December 21 J. S. C. writes: "Some auto maker will awake some time to a realization," etc. In 1902 I bought a Stanhope with just such mud guards as Mr. C. advocates, fitting closely around the tire, and in case of front wheels "supported on the outside by the hub nut," just as he suggests. Being directly connected to the axles, without any spring interposed, the shock of constant jolting broke off the braces so fast that I shortly discarded the guards altogether—as did the maker the following season. Another serious fault was the impossibility of cleaning the under side of the guards, they being so close to the tires. Mr. C. seems to have suspected this, from his suggestion of the use of woven wire fabric for the guards, but if of such open mesh that "a stream of water from a hose would quickly clean," it seems inevitable that the dirty water from the tire would just as readily pass outward, rendering the guard useless. R. W. B.

We have an inquiry for the address of F. L. W., who sent us a description of a box front fitted to his Oldsmobile, which was published in our issue of April 20, 1904. If F. L. W. will send us his address we shall be glad to forward it to the inquirer.

American Automobiles in Spain.

The American automobile has come and conquered. It must be considered a satisfaction for American "auto" manufacturers to know that their machines have, in the fifth city of Spain, triumphed over the models of every other nation. There are now about a dozen autos in Malaga, half of which are of American build. Three more American cars are now en route, and I believe that other orders are about to be placed. In June, 1903, I reported that the possibility existed for the introduction of the American made machine, and results have shown that it only remained for the first machine to make its appearance to insure future sales. The proportion of American autos sold here is all the more creditable when it is considered that our makers suffer because of the lack of equitable tariff rates, owing to the absence of a commercial treaty between Spain and the United States. But the American machines seem to "take," and this success is due largely to their style and noiselessness, in addition to other good qualities.—D. R. Birch, Consul, Malaga, Spain.

Out-of-town subscribers of The Horseless Age, who intend visiting the New York Automobile Show, are requested to communicate with the Editor, if possible mentioning the name of the hotel at which they will stop when in the city.

OUR FOREIGN EXCHANGES

Motor Cars for Newspaper Distribution.

It is probable that in the near future the motor car will become an important instrument in the distribution of newspapers in England. Among the Sunday morning papers the competition is very keen, not only in London but in the south and southeastern counties. Up till recently the towns on the south coast, like Margate, Dover, Brighton, Eastbourne and so on, had to wait for their Sunday papers till the arrival of the first train, which was not very early in the morning. Some weeks ago the conductors of one of these papers started running motor cars to the leading towns on the southeast and south coast, with the result that the papers reached the news agents there long before the Sunday morning trains arrived. Its rivals could not afford to be beaten in this way, and they consequently arranged for a special train to all the leading coast towns.

Dust Binding Materials.

The "Dust Problem" was the subject of a paper read recently by Scott Montagu, M. P., before the Automobile Club of Great Britain and Ireland. Therein he characterized dust as the greatest evil which motorists had to contend with, as it was the cause of nine-tenths of the unpopularity of motor cars. No efforts had been made until the last year or two to lay dustless materials or reduce the amount of dust by using dust laying fluids. Permanent treatment was most practicable at present in connection with tar. Tar macadam and tar slag, both of them, formed dustless roads which, if properly laid down, would outlast roads made on the ordinary system.

Mr. Montagu pointed out that many miles of road could be laid with this kind of dustless material, and cost hardly more than relaying with ordinary granite or quartzite. In ten or twelve years' time a really large proportion of our main roads would then be dustless. It was more important to first have dustless roads near houses wherever traffic was great than on deserted country roads, and therefore experiments ought to begin near towns. The sanitary aspect must also not be forgotten, as dust carried with it many noxious bacteria, causing disease, so it was not only in the interests of the road user, but to the interest of the authorities dealing with public health and the community at large, that there should be reduction in the amount of dust raised.

Among the palliative fluids for laying dust Westrumite and Akonia were the best known and most largely used, and when it was desired to lay dust for race meetings or large gatherings they answered very well, but were not sufficiently permanent to adopt on a large scale. However, they were much better than watering, which was always bad, as it was not only destructive to road material but tended to create mud, the precursor of dust.

Officially Observed 4,000 Mile Run.

The Automobile Club of Great Britain and Ireland has issued a certificate to the effect that a 16 to 20 horse power Martini car, carrying four passengers, and weighing 23¾ cwt. (without passengers), fitted with Dunlop tires, size 875 by 105 mm. front, 880 by 120 mm. back, completed a distance of 4,002 miles under ordinary touring conditions, and under the continuous observation of officials appointed by the club. The daily run consisted of a maximum of 200 miles a day on main roads, starting from and returning to the Automobile Club. The number of days occupied was 22, the total consumption of gasoline 245¼ gallons, the total consumption of water 3.9 gallons, the average daily mileage 181.8, the average mileage per gallon of gasoline 16.3, and the average mileage per gallon of water 1,015. The parts used in the renewal of the differential gear—namely, the four small bevel pinions—have teeth which are of a form which is an improvement on those originally used. The roads throughout the trial were somewhat heavy and greasy, and there was much fog. Rain and snow and numbers of loose patches of stones were encountered. On the fourth day a bad side slip occurred, the near hind wheel hitting the curb hard and slightly displacing the rim. This caused the tire to chafe on the head of the chain bolt. A new wheel and tire were fitted at the end of the day's run. Three other side slips also occurred. The car was fitted with low tension magneto ignition.

The Hungarian Automobile Club has been admitted to the recognized automobile clubs of the world.

The Great Northern Automobile Week will be the event of next summer in Copenhagen. There is to be four days' racing for automobiles and motorcycles through the whole of Denmark.

E. A. Livet has just given a special show of an extraordinary motor car trick at Earl's Court, London. The car is started from a table, drops end on to the ground, turns turtle, and, completing the somersault, comes back onto the wheels again. The greatest shock occurs as the front wheels strike the ground after the turn, as the car weighs over half a ton. Mr. Livet intends to give a public exhibition at one of the London music halls as soon as arrangements are completed.

The number of motor vehicles in use in Belgium has been increasing very rapidly in recent years, as shown by the following figures: Cars in use in December, 1901, 1,332; December, 1902, 1,991; December, 1903, 2,618; December, 1904, 3,698.

An idea of the expensive decorations at the Paris Automobile Show may be obtained from the following figures, representing the alleged cost of several individual stands: De Dietrich, $5,000; Panhard, $2,500; Hotchkiss, $1,500; Krieger, $1,250.

According to a law passed in 1901, a motorist in Germany can be punished for allowing his car to give off too great a smell of gasoline. A German automobilist was fined for this offense recently and appealed to a higher court. It has now been decided that punishment for such an offense can only be meted out "when the smell is so great as to force passersby to take another road to that used by the automobilist in question."

For the conveyance of passengers and mails over long distances in Cape Colony not well served by railways, the Wolseley Tool and Motorcar Company is making motor vans of 24 horse power. The new vehicle is designed to carry six passengers, a driver, a conductor, and half a ton of mails and luggage. The weight of the van, empty, but fully equipped, is about 1½ tons. The frame is of steel, and the tires are 3 inch solid rubber. The motor has four cylinders. The gearing provides for four speeds forward—7, 11, 20 and 26 miles per hour—and one reverse. Under average conditions the van will be equal to a 70 miles journey on one load of gasoline the tank carrying 10 gallons.

The entries for the French eliminating trials for the Gordon Bennett Cup have already assumed imposing proportions. Sixteen firms have stated their intention of entering forty-three cars. But there is a proposal that if a firm has granted a license to another to make cars under its patterns, the two may enter only three cars between them. The suggestion is objected to by the makers, and would slightly reduce the list of entries. This is so far as follows: Richards-Brasier, three 110 h. p.; Mors, three 130 h. p.; De Diétrich, three 120 h. p.; Darracq, three 140 h. p.; Gobron-Brillié, three 150 h. p.; Renault, three 90 h. p.; La Buire, two 120 h. p.; Rochet-Schneider, two 120 h. p.; Panhard, three 120 h. p.; Turcat-Méry, three 120 h. p.; Bayard-Clément, three 120 h. p.; Hotchkiss, three 150 h. p.; Gardner-Serpollet, three, — h. p.; Delaunay-Belleville, two 120 h. p.; Berliet, two 130 h. p.; Boyer, two 120 h. p.

LEGISLATIVE AND LEGAL.

The Right of Towns to Restrict Speed.

CHESTER, Pa.—The Superior Court has decided that a township has the right to prescribe the speed at which vehicles shall travel over highways. The opinion was handed down by Judge Orlady in the case of Samuel Bell, Jr., of Philadelphia, who had been fined for exceeding the speed limit under the ordinances of Doylestown and had appealed. In affirming the judgment of the lower court the judge said:

"The State Legislature has beyond question the power to provide for the construction and maintenance of the public highway, whether streets in cities or boroughs, or roads in townships, and it has as full and clear power to provide regulations for their use. It must also be conceded that this power may be delegated without diminution to a local municipality. A municipal corporation has for its objects the interests, advantage and convenience of the locality and its people. It is a local government possessing powers of legislation, within its delegated or reasonably implied powers, and is charged with the general welfare of the people.

"Some of the townships of the first class represent a larger population, and their highways are more used than those of many boroughs. We are not prepared to say that an ordinance limiting the speed of an automobile to 10 miles an hour is unreasonable when a lower rate of speed is prohibited by the Legislature in less densely settled communities. The commissioners are prima facie the best judges of what is a reasonable speed for such a vehicle in Radnor Township. No special fact is suggested in this record to show that 10 miles an hour is not a reasonable limitation, nor that 16 miles an hour—the rate at which the defendant was going when arrested—is unreasonable."

ST. PAUL, Minn.—A. P. Chase & Co., of Minneapolis, have been granted a new trial of their case against Baskerville & Co., of Watertown, S. Dak., for the unrightful selling of an automobile. An adverse decision was granted in the lower courts.

CINCINNATI, Ohio.—The Hamilton County Farmers' Institute have passed resolutions indicating their disapproval of the apparent disregard of motorists for the rights of others, and have forwarded them to the State authorities with a request for sterner legislation in the matter.

NEW ORLEANS, La.—The authorities of St. Bernard have passed an ordinance limiting the speed of automobiles to 15 miles an hour maximum, and 6 miles an hour when approaching or passing a vehicle drawn by a horse or mule. It is expected that the measure will be rigidly enforced.

COLUMBUS, Ohio.—An unpleasant experience with a swiftly driven automobile has roused Mayor Jeffrey, who will seek to amend the automobile law so that no person but an owner may take out a license. His attempt to arrest the driver of the machine in question revealed the fact that it was driven by a person not its owner and that its license had been secured by a third person not its owner.

DETROIT, Mich.—On November 28 a man was arrested for speeding an automobile along Woodward avenue. He refused to give his name, but the police identified the machine as being the property of the Packard Motor Car Company. The company shielded the man at first, but upon the threat of Judge Phelan to fine the company itself for the offense, they made known his name. The case has not yet come to trial.

YOUNGSTOWN, Ohio.—Mary T. Bachman, of Salem, has brought suit for $15,000 against Emory E. Silvers for alleged recklessness in driving his automobile on November 13. The bill states that the plaintiff, while driving a horse and cart along a narrow roadway, met the defendant, who neither slackened his speed nor yielded a proper share of the road. The plaintiff's wagon was struck and overturned into a deep ditch, and she was thrown out and severely injured.

ST. LOUIS, Mo.—Delegates Hughes has introduced three automobile bills in the House of Delegates. One provides for the numbering of automobiles, the figures to be immovably attached to the rear of the car, duplication of numbers to be penalized. The second governs the speed, fixing the limit at 15 miles per hour through the day and 10 miles per hour at night, while the third governs the rate for the registry for the various types of machine thus: Pleasure vehicles, one seat, $3; two seats, $5; broughams, three seats, $6; four or more seats, $10; truck, delivery wagon or cart, 1 ton or less, $7; 1 ton or more, $10; motorcycle, $2.

ELKHART, Ind.—The Farmers' Institute, of Goshen, is circulating a petition to the Legislature anent the legal restriction of reckless automobile driving. The paper embodies suggestions as to the regulation of registration and the display of numbers; the establishment of a speed limit of 5 miles an hour when passing horses; provision for a heavy fine in cases where operators do not stop on signal from the drivers of horses, and a clause holding the owners of any form of horseless vehicle responsible for any damage done by such a machine, and making it a penal offense for the driver of an automobile to leave the victim of an accident without giving all reasonable assistance.

Commercial Vehicle Notes.

The Wilson Auto Transit Company has been organized in Raleigh, N. C., to operate automobile stage lines throughout the State.

The San Francisco post office authorities are conducting a series of comparative tests between motor cars and horse drawn vehicles in collecting mails from the various sub-stations.

Charles H. Corley, of Hartford, Conn., recently gave the officials of that city a demonstration of the operation of a motor propelled street cleaner, which he has designed and constructed. The machine is driven by a kerosene motor of 24 horse power.

Four commercial travelers of St. Louis, Mo., recently made a test of the utility of motor cars for their service. They covered a route of about 385 miles between small towns in the vicinity of East St. Louis, which heretofore they have covered in carriages. It is said that a great saving in both time and expense was shown.

The Birmingham and Midland Motor Omnibus Company has been formed at Birmingham, England, with £60,000 capital to acquire and take over as a going concern the business of the Birmingham Motor Express Company, which was established in 1903 and is carrying on business in Birmingham as motor omnibus proprietors, particularly on the Hagley road and Harborne routes. It is the intention of the directors as opportunity arises to open up new routes in Birmingham and district, and to carry on during the summer season the business of contractors for pleasure parties, which the directors anticipate will bring in considerable revenue. The traffic returns from April 11 last to November 15 have been examined, and the following figures are certified: Passengers carried, 1,046,891; mileage, 120,152 miles; receipts, £7,303.

The London County Council invites tenders for the supply of a motor steam fire engine. Persons desiring to submit tenders may obtain the specification, form of tender, and other particulars at the department of the Clerk of the Council County Hall, Spring Gardens, S. W., upon payment to the cashier of the council of the sum of £1. This amount will, after the council or its committee have come to a decision upon the tenders received, but not before, be returned to the tenderer, provided he shall have sent in a bona fide tender and not have withdrawn the same. Tenders must be upon the official forms, and the printed instructions contained therein must be strictly complied with. Each tender is to be delivered at the County Hall, in a sealed cover addressed to the Clerk of the London County Council, Spring Gardens, S. W., and marked "Tender for Motor Steam Fire Engine." No tender will be received after 10 a. m. on Tuesday, December 20.

Club Notes

UTICA (N. Y.) A. C.

The Automobile Club of Utica is arranging to hold a banquet on the evening of Monday, January 9, at the close of its annual meeting. It will take place at the Butterfield House. Since its last meeting the club has received nine new members.

N. Y. MOTOR CLUB.

At a smoking concert held by the Motor Club in Bretton Hall on December 21 seventy-five persons were present. It was decided to hold a reception and entertainment for visitors to the two New York shows on the evenin~ of Sunday, January 15.

DETROIT A. C.

An automobile club was organized at a meeting at the Russell House recently, the originators of the idea being William E. Metzger, E. H. Broadwell and R. D. Chapin. There is an invitation membership of 100 and responses are being received. The club plans to have fitted up a suite of several rooms in the basement of the Russell House, some of which will be used by the members as a café and others for lounging and meetings.

DALLAS (TEX.) A. C.

The club has petitioned the city council for the use of the fair grounds track on the New Year's holiday, January 2, for the purpose of holding a 100 mile automobile race, for which a prize of $250 is being offered. No admission will be charged to the grounds.

The regular monthly meeting was held at the Commercial Club on the evening of December 13, at which the new constitution and bylaws, as reported by the special committee for that purpose, consisting of Messrs. E. H. R. Green, E. J. Kiest and Dr. Earl Wilson, were read. The matter was taken up section at a time, and adopted as read, with one or two unimportant changes, such as reducing the number necessary to constitute a quorum from fifteen to ten members. The club has applied for membership in the A. A. A.

A. C. A.

The annual banquet of the club will take place as usual at the Waldorf-Astoria Hotel, New York city, on the last evening of the Automobile Show, January 21. The grand ballroom and the Astor gallery will be splendidly decorated for the occasion, and among the speakers will be the following: Senator John H. Mitchell, of Portland, Ore., chairman of the Committee on Coast Defense of the United States Army; Hon. Charles F. Warwick, of Philadelphia; P. F. Murphy, Winthrop E. Scarritt, S. W. Taylor, William P. Eno, and Wm. H. Page, Jr. President Dave H. Morris will preside.

SYRACUSE A. C.

At a meeting at the Yates Hotel on December 21 it was decided to hold the annual banquet on Tuesday evening, January 3, and the following committee was appointed to look after the arrangements: H. W. Smith, chairman; C. Arthur Benjamin, C. L. Amos, Frederick H. Elliott and W. L. Brown. The president was empowered by the meeting to appoint a nominating committee to select a list of officers which are to be voted upon at the annual meeting of the club on January 9. As delegate to the meeting of the A. A. A. in New York city on January 16, President Brown was selected, with H. W. Smith as alternate.

BUFFALO A. C.

The annual meeting and election of officers took place on December 19, and the following ticket was elected: President, A. H. Knoll; vice president, H. A. Meldrum; secretary, D. H. Lewis; treasurer, Charles Clifton; board of governors, Edward H. Butler, E. R. Thomas, W. H. Baker. A total of only forty-seven votes was cast, although the club has a membership of 445, being claimed to be the third largest club in the country. The report of Treasurer Clifton showed that from October, 1903, to December 19, 1904, the cash on hand and actual assets of the club had increased from $280.26 to $2,480.79. Retiring President Hotchkiss was presented with a speedometer-odometer. After the first of the year the club will have a bureau of information at the club rooms to inform members regarding the condition of roads in the vicinity of the city, etc. The movement to secure new club rooms centrally located is progressing well.

LONG ISLAND A. C.

The annual meeting and banquet at the new club house in Cumberland street, Brooklyn, last week, was the first function held there, and was attended by eighty-two members. The following ticket was elected by acclamation: President, Alfred Wilmarth; vice president, August A. Post; secretary, Frank L. Evans; treasurer, Raymond Heay; governors for one year, Frank G. Webb, Laurence Abraham and F. M. Sharp, M. D.; for two years, A. R. Pardington, L. R. Adams and Z. N. Allen. Membership committee—Edwin Melvin and F. B. Stephenson. W. P. Richardson acted as toastmaster during the evening and the speakers included Frank G. Webb, Alfred Wilmarth, L. R. Adams, A. R. Pardington and A. A. Post. The club has at present 123 members, and the garage in connection with the club house offers accommodation for twenty-nine machines. Land has been bought adjoining the club house, upon which it is intended to erect an addition, to more than double the present storage facilities.

New Incorporations.

Reo Automobile Company, Chicago. Capital, $6,000. Incorporators, C. A. Coye, Anna M. Andrews, H. C. Foster.

Mobile Motor Car Company. Capital, $25,000. Incorporators, Robert C. Morris, A. J. Spencer, M. C. Henville, F. S. Stone, Stewart Brooks.

Eastern Motor Vehicle Company, Boston. Capital, $50,000. Incorporators, Charles G. McCutchen, Frank W. Richards, Arthur T. Smith, F. L. Hanson, F. B. Hill.

Wilson Auto-Transit Company, Wilson, N. C. Capital, $100,000. Incorporators, W. B. Young, Hattie B. Young, J. C. Hales, B. W. Kincaid, C. F. Botts, R. E. Massey, S. H. Finch.

Trade Literature Received.

Monarch Automobile Company, 218 La Salle street, Chicago, Ill.—Folder descriptive of the Monarch Model B runabout.

Beaver Manufacturing Company, Milwaukee, Wis.—Illustrated leaflets showing the company's gasoline motors.

The Tritt Electrical Manufacturing Company, South Bend, Ind.—Catalogue of Peerless ignition devices.

Higgins Spring and Axle Company, Racine, Wis.—Catalogue of vehicle springs, axles and fittings, together with tables giving dimensions of standard springs and safe carrying loads.

Alexander & Crouch, Chicago, Ill.—Fourth Annual Catalogue of Automobile and Marine Motors and Supplies.

E. R. Thomas Motor Company, Buffalo, N. Y.—"It's What They Say"—being a pamphet containing testimonials from users of their cars.

The Autocar Company, Ardmore, Pa.—Folder giving advance information concerning the 1905 Autocar.

Hyatt Roller Bearing Company, Harrison, N. J.—Announcement of the Hyatt third annual meeting and dinner.

Joseph Dixon Crucible Company, Jersey City, N. J.—*Graphite* for January.

Brown-Lipe Gear Company, Syracuse, N. Y.—Catalogue of equalizing and steering gears for automobiles.

The Reading Automobile Company, Reading, Pa.—Pamphlet showing the Reading ratchet foot levers.

Warner Instrument Company, Beloit, Wis.—Folder showing the "Auto Meter," a combination speedometer and odometer.

R. M. Clough, Tolland, Conn.—Catalogue of gear cutting tools.

Packard Electric Company, Warren, Ohio.—Booklet regarding Packard ignition cable.

The Constant Spark Plug Company, 135 Oliver street, Boston, Mass.—Pamphlet describing the Constant spark plug.

Fuller & Sullivan, 19 Elliot street, Boston, Mass.—Catalogue of F. & S. brand automobile clothing.

MINOR MENTION

The Orlando F. Weber Company have secured the Chicago agency for Buick cars.

The Hill Automobile Company has been organized in Haverhill, Mass., to manufacture motor cars.

The Knox Automobile Company are erecting a new sales building at 1204 Michigan avenue, Chicago.

The Geber automobile factory at Beatty street and Penn avenue, Pittsburg, was destroyed by fire last week.

Contracts have been let for the erection of a plant for the Memphis (Tenn.) Automobile Company. They are to manufacture steam cars driven by the Pilcher compound engine.

Considerable damage was done by a fire in the garage of the Mississippi Valley Automobile Company of St. Louis, Mo., recently, which was started by an employee who lighted a match near an open pan of gasoline.

During the eleven months ending December 1, 1904, 2,340 automobile licenses were taken out in Philadelphia, while for the whole of 1903 the figures are 1,663. It is noteworthy that some 400 persons who held licenses last year did not have them renewed for 1904.

The St. Louis Car Company have purchased the Whitaker-Weber plant at 5300 North Second street, and it is said will soon remodel it to suit their needs. The capital stock of the company has been increased to $500,000. They will manufacture a large touring car.

The officers of the Duquesne Construction Company, which was recently organized in Jamestown, N. Y., to build automobiles, are: President, W. J. Maddox; vice president, Frank L. Bliss; treasurer, Brewer D. Phillips, and secretary, M. R. Stevenson. These, together with Le Roy Pellatier, form the boar dof directors.

The Reliance Automobile Manufacturing Company have reorganized under the name of the Reliance Automobile Company, with an increased capital stock of $400,000. The directors are: J. M. Mulkey, president; Fred O. Paige, vice president, and Frank R. Thrall, secretary and general manager. These, with James T. Lynn, Sidney T. Miller, Hugh O'Connor and George C. Wetherbee, form the board of directors.

The United States Automobile Company have been formed in Rochester, N. Y., with a capital of $200,000. They propose to operate a system of garages. The officers are: President, Harry S. Woodworth; secretary, Austin F. Crittenden, and treasurer, Henry H. Love; executive committee, H. S. Woodworth, H. H. Love and John Barhite; directors, H. S. Woodworth, J. Foster Warner, Charles F. Garfield, H. H. Love, John A. Barhite, Austin F. Crittenden and Henry G. Day.

The Luverne Automobile Company will bring out a 16 horse power touring car for 1905.

The Scranton (Pa.) Garage and Motor Company, with a capital of $25,000, have organized.

W. Philip Johnson, of 1231 Webster street, New Orleans, La., has been appointed agent for Thomas cars.

The Diamond Rubber Company, of Akron, Ohio, will move into a three story addition to their office building on January 1.

The Providence (R. I.) Y. M. C. A. will open an automobile school under the direction of Parker H. Kemble, of Boston, on January 10.

While racing at San Bernardino, Cal., recently Barney Oldfield lost control of his car through the bursting of a tire, it is said, and ran off the track.

The Buick Motor Company, of Jackson, Mich., write us that W. L. Hibbard is not connected with that company, as was reported in these columns.

Mrs. A. Mora is said to be negotiating with a view to erecting a brick garage on Main street, between Masonic and Church streets, New London, Conn.

The Southern Automobile Company, of Nashville, Tenn., are building a large structure at 167 North College street, which is to be used as a garage and salesroom.

Space has been allotted at the Importers' Automobile Salon to the makers of the Gobron-Brillie and Leon Bollee cars. These additions bring the list of exhibitors up to forty-three.

The Hyatt Roller Bearing Company have sent out invitations to their third annual banquet and vaudeville entertainment, which will be held at Bretton Hall Hotel, New York city, on January 18.

The Sioux Falls (S. Dak.) Auto Company has been incorporated, with a capital of $50,000, to engage in the automobile sales business. B. H. Lien is president and H. M. Avery secretary.

The 1905 Pope-Tribune, made at Hagerstown, Md., will be equipped with a two cylinder, water cooled motor with bore and stroke of 4½ inches and a three speed gear of the individual clutch type and bevel gear drive.

The Hubbard Motor Company, Incorporated, of Middletown, Conn., has filed certificates of incorporation and organization, the incorporators being H. W. Hubbard, John T. Eugenian and Robert H. Downes. The authorized capital is $100,000.

The officers of the Eastern Motor Vehicle Company, of Boston, Mass., are: Chas. G. McCutchen, president; Frank M. Richards, treasurer; Arthur T. Smith, F. L. Hanson and F. B. Hills, with the others mentioned form the board of directors.

The Reo Automobile Company, of Chicago, has been organized to handle the local agency for Reo cars. Other agencies established by the Reo Car Company, of Lansing, are Meadows & Hafer, Buffalo, N. Y., and the Reo Automobile Company, of Ohio, at Cleveland.

The city council of St. Louis, Mo., has appropriated $2,coo for the purchase of an automobile for Fire Chief Swingley.

The fire commissioners of San Francisco have advertised for bids for an automobile for the chief of the fire department.

F. B. Van Alstyne, formerly with the Crest Manufacturing Company, has been appointed sales manager for the St. Louis Motor Carriage Company.

Reduced railroad rates have been granted to members of the American Automobile Association and American Motor League who visit the New York Show.

A line of gasoline propelled motor stages is to be established between Grand Forks, B. C., and Greenwood and Phœnix. The cars will have a capacity for twelve passengers.

Tax Commissioner Fleming, of Omaha, Neb., who has compiled a list of automobiles, finds that there are $100,000 worth of cars in that city. Assessments have been made on seventy-five cars.

A. G. Hester has been appointed receiver for the Toledo, Ohio, Police Notification and Auto Express Company, upon petition of John Howard, A. G. Hester and E. C. Schinness, who allege that mismanagement has resulted in rapid depreciation of the company's plant.

At the first meeting of the Chauffeurs' League of Paris, M. Raynaud, a notary, was elected president, and it was resolved (1) to combat arbitrary judicial decisions; (2) to pay chauffeurs' legal costs when necessary; (3) to watch cases in automobiling interests; (4) to agitate for reform and uniformity in driving regulations; (5) to obtain a reduction of taxes and insurance; and (6) to reward services rendered chauffeurs.

The Jackson (Mich.) Automobile Company have made agency contracts as follows: Chicago and Southern Illinois, Hagmann & Hammerly; Cincinnati, Ohio, Charles Hanauer; Terre Haute, Ind., Hildebrant Buggy Company; Akron, Ohio, Charles E. Howland; Buffalo, N. Y., Jackson Automobile Company; Boston, Mass., E. P. Blake & Co.; Trenton, N. J., W. P. Conrad; Buenos Ayres, South America, A. P. Guilland.

According to a count made on a recent Friday, between 2 and 7 o'clock in the afternoon of that day, 7,576 vehicles of all descriptions passed Thirty-fifth street at Fifth avenue. Of these, 3,668 were private carriages, 2,200 cabs, 520 automobiles, 309 heavy trucks, 414 delivery wagons, 251 express wagons and 248 stages. Only about 25 per cent. of the vehicles were of the heavy kind, but, says the Herald in printing these figures, "because of their size and slow movement they kept the tide of travel at a standstill for fully one-half the time."